

Midwest Opportunities To Regenerate Soil Health

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2018



unlock the
SECRETS
IN THE **SOIL**



United States
Department of
Agriculture

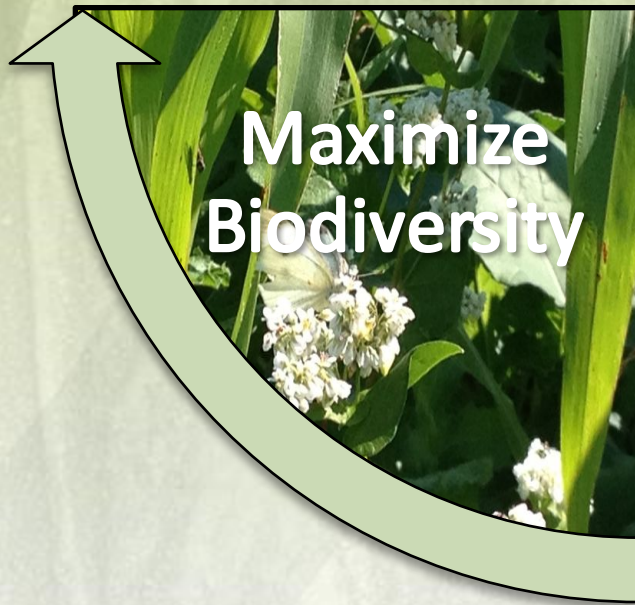
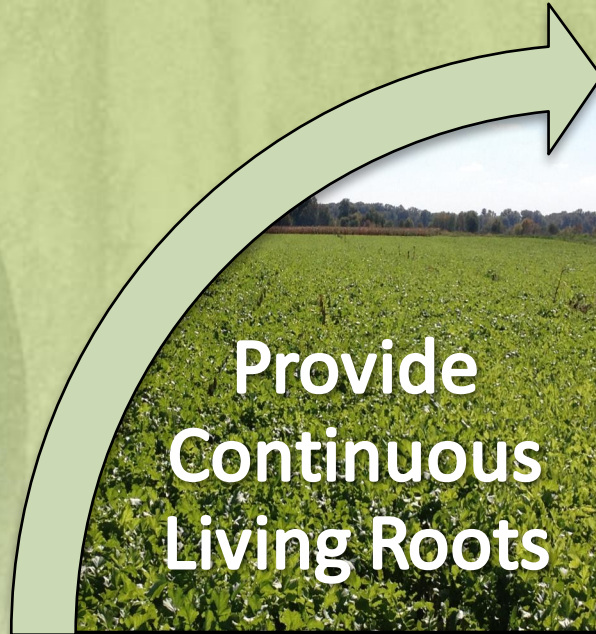
Natural Resources Conservation Service



SOIL HEALTH:

The continued capacity of a soil to function as a vital, living ecosystem that sustains plants, animals, and humans.

Soil Health Principles





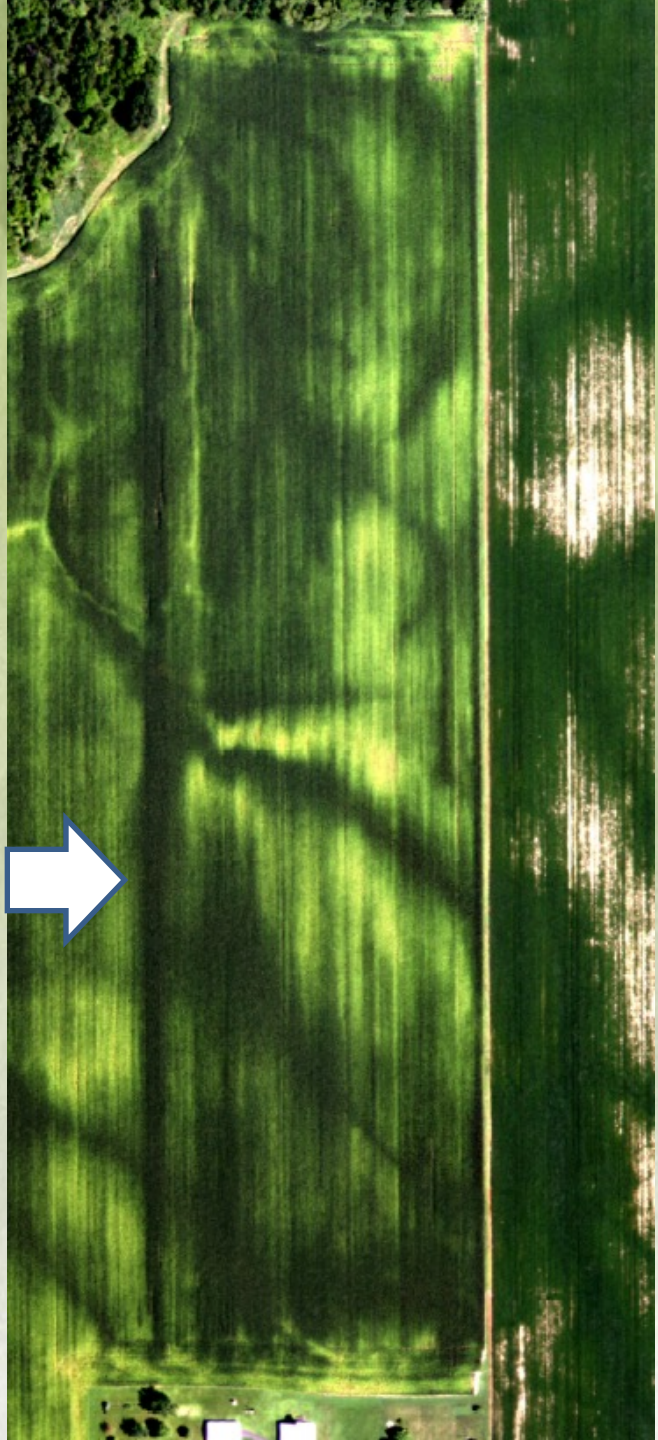
Soil Health Principles To Support High Functioning Soils

- **Feed** diverse, continuous inputs (C sources, energy)



- **Protect** habitat (aggregates and organic matter)

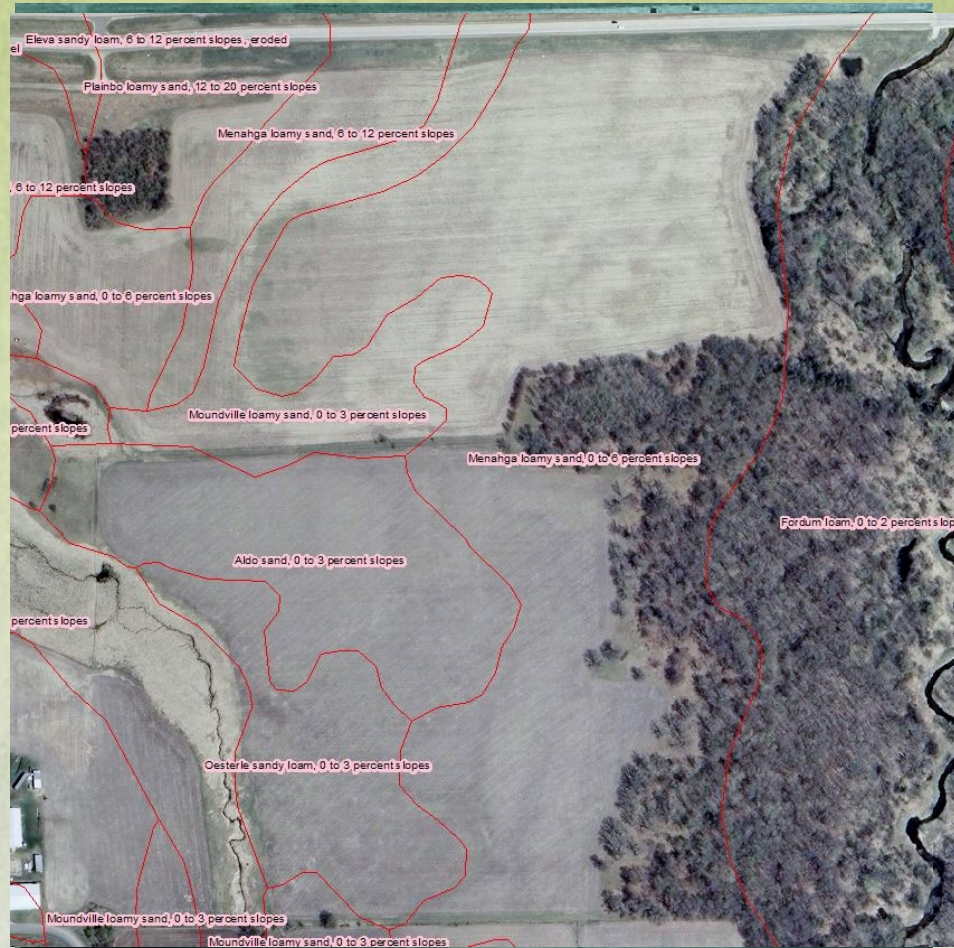




The Fence Row Effect



Soil Health Principles at work



Principles at work



J. Maloney, Brownsburg, IN

Making Soil Health A Priority!



- What does *Soil Health* mean?
- Key Indicators/Functions =
 - Improving organic matter
 - Improving aggregate stability
 - Increasing water infiltration
 - Increasing available water
 - Improving nutrient cycling
 - Balancing and diversifying soil biology





Making Soil Health A Priority!

These are broadly accepted and listed in numerous peer reviewed papers and text books as indicators and functions that drive improved production, resilience to extreme growing conditions, and reduce costs that lead to net economic gains.

- Improving organic matter
- Improving aggregate stability
- Increasing water infiltration
- Increasing available water
- Improving nutrient cycling
- Balancing and diversifying soil biology





Making Soil Health A Priority!

production, resilience, and reduce costs

Improving organic matter

- stores and steadily releases crop nutrients, (production, resilience, costs)
- holds water and increases water availability, (production, resilience)
- improves infiltration of rainfall into the root zone, (production, resilience)
- improves air/gas exchange and (production, resilience,)
- increases yields. (production)



Making Soil Health A Priority!

production, resilience, and reduce costs

Improving aggregate stability

- Reduces crusting for better crop emergence (production)
- provides resistance to erosion and lost nutrients (production, resilience, costs)
- improves infiltration of rainfall and irrigation water (production, resilience)
- increases water availability for plants and soil organisms (production, resilience)
- More...



Making Soil Health A Priority!

production, resilience, and reduce costs

Increasing water infiltration

- improved irrigation efficiency (costs)
- Harvest more rainfall and irrigation water for crop growth (production)
- Reduces nutrient loss from runoff (production, costs)
- Reduces ponding and saturated soils for timely planting and field operations (resilience)
- Reduces denitrification (production, resilience)



Making Soil Health A Priority!

production, resilience, and reduce costs

Increasing water infiltration and available water

- improved irrigation efficiency (costs)
- More water available for crop growth and process (production)
- Reduces nutrient loss from runoff, ponding (production, costs)
- provides water for important biological processes and cycles (production, resilience, costs)
- serves as a temperature regulator for plants during extreme weather (resilience)



Making Soil Health A Priority!

production, resilience, and reduce costs

Improving nutrient cycling-biologically driven

- Delivers “time released” nutrients to crops (resilience)
- Biologically supplied nutrients enhance or complement applied nutrient management strategies (production, costs)
- improves nutrient availability to crops during extreme events (resilience,)
- reduces nutrient loss pathways by providing backup sequestration in non- crop seasons (costs)

Soil Health Management System



Collection of conservation practices that focus on maintaining or enhancing soil health



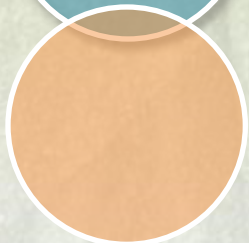
Address all four of the soil health principles



Create a “synergistic” effect



Cropping system specific



Are practical and logical



Soil Health Management System

- Achieving soil health through:
 - A Quality No-till System
 - Diverse and Strategic Cover Crops
 - Adapted Nutrient Management
 - Integrated Weed & Pest Management
 - Diverse Crop Rotations
 - Precision Farming Technology
 - Prescriptive Buffers and supportive practices



Soil Health is not a destination...it's a Journey



Quality No-Till/Strip-till



Adapted Nutrient Management



Prescribed Cover Crops



New Technology and Integrated Weed & Pest Management



Diverse Crop Rotation



Quality No-Till/Strip-till



Adapted Nutrient Management



Prescribed Cover Crops



New Technology and Integrated Weed & Pest Management



Diverse Crop Rotation



Quality No-Till



Ecological Nutrient Management



Prescribed Cover Crops & Grazing



Integrated Weed & Pest Management and Precision Technology



Diverse Crop Rotation



Quality No-Till/Strip-till



Adapted Nutrient Management



Prescribed Cover Crops



Precision Agriculture
and
Integrated Weed &
Pest Management

Diverse Crop Rotation

Developing Nutrients Management Strategies for Soil Health Cropping Systems



• 4-Rs

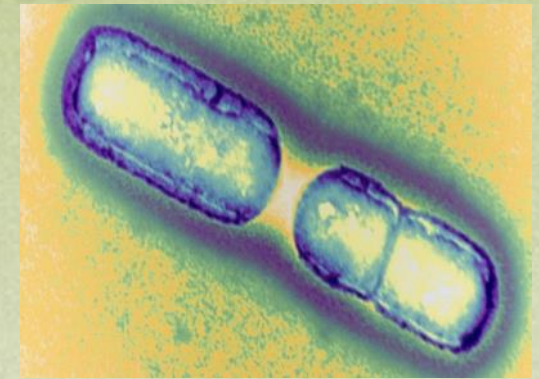
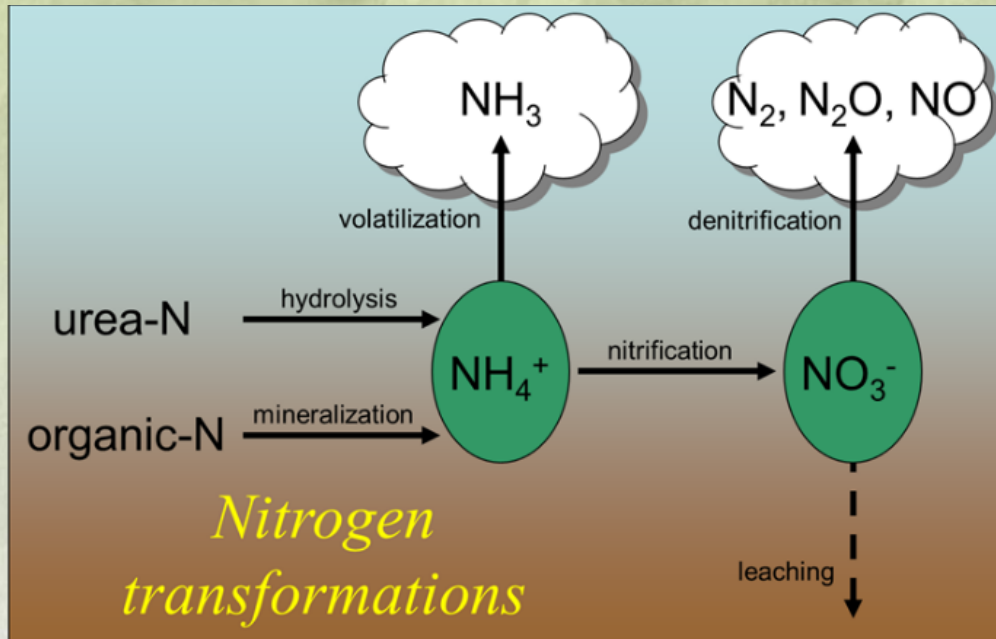
Must include SOM and Organic Nutrient Contribution





**A simple approach to
Understanding C:N Ratios
and biological drivers
for corn production and water
quality**

Nitrogen Mineralization and Immobilization



Biology



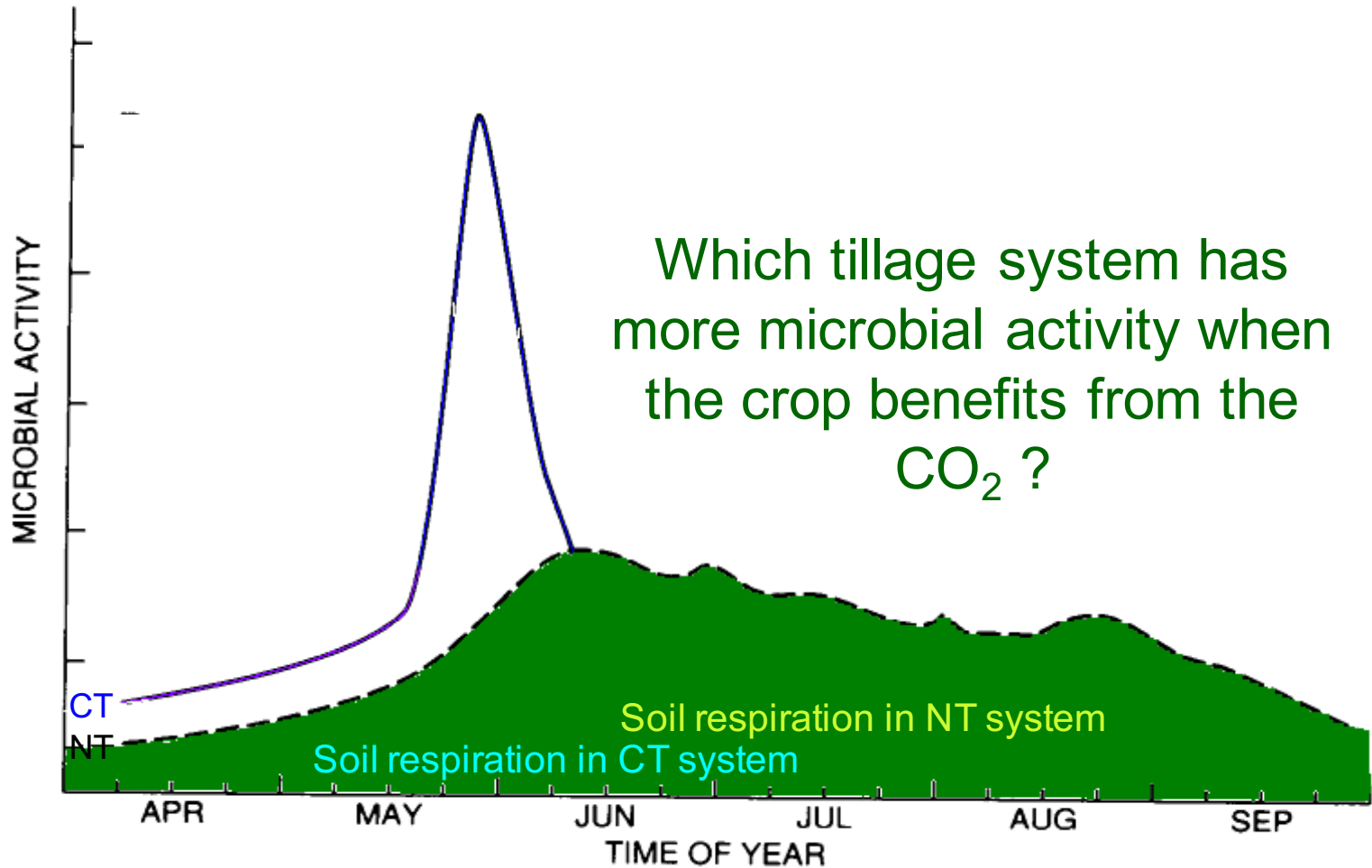


Only 30-55% of Inorganic Fertilizer is Directly Used by Plants

Fertilizer N applied (lb/ac)	Corn grain yield (Bu/ac)	Total N in corn plant (lb/ac)	Fertilizer-derived N in corn (lb/ac)	Soil-derived N in corn (lb/ac)	Fertilizer-derived N in corn as % of total N in corn
45	62	76	25	54	33
89	73	130	49	81	38
178	88	140	77	63	55

Calculated from Reddy and Reddy, 1993 and modified from Weil & Brady, The Nature and Properties of Soils, 15th ed.

Effect of tillage on microbial activity



Strategically... CC should match desired C:N Ratio

Material	C:N Ratio	
Rye Straw	82:1	} Good for Soybean
Wheat Straw	80:1	
Oat Straw	70:1	
Corn Stover	57:1	
Rye Cover Crop (Anthesis)	37:1	
Rye Cover Crop (Vegetative)	26:1	
Mature Legumes	25:1	
Balanced Microbial Diet	24:1	
Daikon Radish	19:1	} Good for Corn
Crimson Clover	17:1	
Ryegrass (Vegetative)	15:1	
Young Alfalfa	13:1	
Hairy Vetch Cover Crop	11:1	
Soil Microbes (Average)	8:1	





Strategically...

Planning the System Using the Step by Step Approach

Enjoy The Rewards of
Soil Health!



Managing for a Living Ecosystem Requires Dynamic Management

**“We can take production and
conservation further with
management systems that
continually build
Soil Health ”**

USDA is an equal opportunity provider,
employer, and lender.”





MORE INFORMATION ABOUT SOIL HEALTH

Google = "NRCS Soil Health"

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United States Department of Agriculture

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Soils

Soil Health



Soil Health Theater



Dig A Little, Learn A Lot

Unlock the Secrets in the Soil

Soil is a living and life-giving substance, without which we would perish.

As world population and food production demands rise, keeping our soil healthy and productive is of paramount importance. So much so that we believe improving the health of our Nation's soil is one of the most important endeavors of our time.

By focusing more attention on soil health and by educating our customers and the public about the positive impact healthy soils can have on productivity and conservation, we can help our Nation's farmers and ranchers feed the world more profitably and sustainably – now and for generations to come.

The resources on this soil health section of our site are designed to help visitors understand the basics and benefits of soil health – and to learn about Soil Health Management Systems from farmers who are using those systems.

So whether you're a farmer, a researcher, a conservationist or an interested citizen, the information on this site will help you "Unlock the Secrets in the Soil."

Voices of Soil Health



Share

More info



Soil Health Campaign



Soil Health Awareness

Unlock the Secrets in the Soil

Sign up for e-mail updates on Soil Health Awareness

Soil is a living and life-giving natural resource. As world population and food production increase, the importance of our Nation's soil is one of the most significant challenges we face. The resources on this soil health website will help you understand the basics and benefits of soil health and the various soil health management systems from farmers who are unlocking the secrets of the soil.

soil health THEATER
Watch Our Videos

dig a little LEARN A LOT
Learning Resources

GROW! with it!
Learn From Growers

MEDIA get the DIRT on it
News Media Resources

GROWING & SHARING
Partner Resources

BIOLOGY & BEYOND
Soil Health Science

Behold Our Living SOIL

Vote and help promote Soil Health

NRCS has developed a national soil health contest for farmers and consumers to help promote soil health—and one of them will become a national poster. Visit here to vote for your favorite soil health print ad today and help us select a winner that will become our national poster in 2018. Once the winner is chosen and printed, you'll be able to order one, free of charge, for your home, office or school. Vote as often as you'd like and please feel free to ask others to vote, too!

After voting, you can view the results to see which ad is currently in the lead. The poll closes November 3, so please vote today!

Explore the Science of Soil Health

Profiles in Soil Health

Under-Cover Farmers of Stanley County, NE

They, like many other farmers, have adopted cover crops and can be seen in NRCS' Soil Health Theater.

OKLAHOMA

PROFILES IN soil health

Jimmy Emmons
Dewey County, Oklahoma
2,000 acres
Crops: Wheat, alfalfa, canola, cow/calf operation
Covers: Multi-species



- Raised awareness
- Expanded demand for system adapted information
- Raising many good questions

MONTANA

PROFILES IN soil health

Julie Taylor

Changes Soil Health

Julie Taylor, who farms on the Fairfield Bench, has changed her farming practices to include no-till farming methods, planting cover crops, composting to augment soil fertility, and intensively grazing both hay land and rangeland.

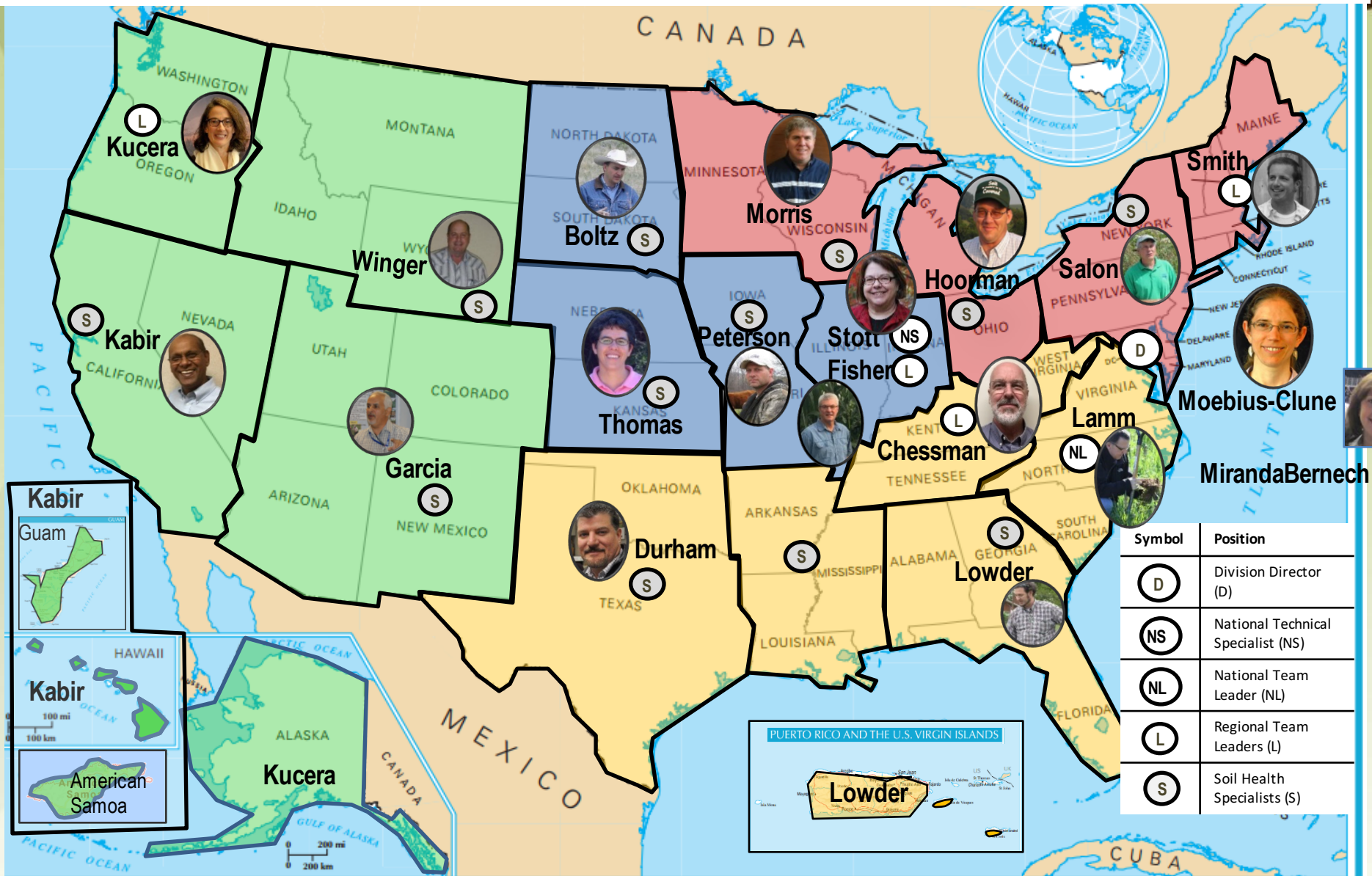


unlock

THE SCIENCE OF SOIL HEALTH



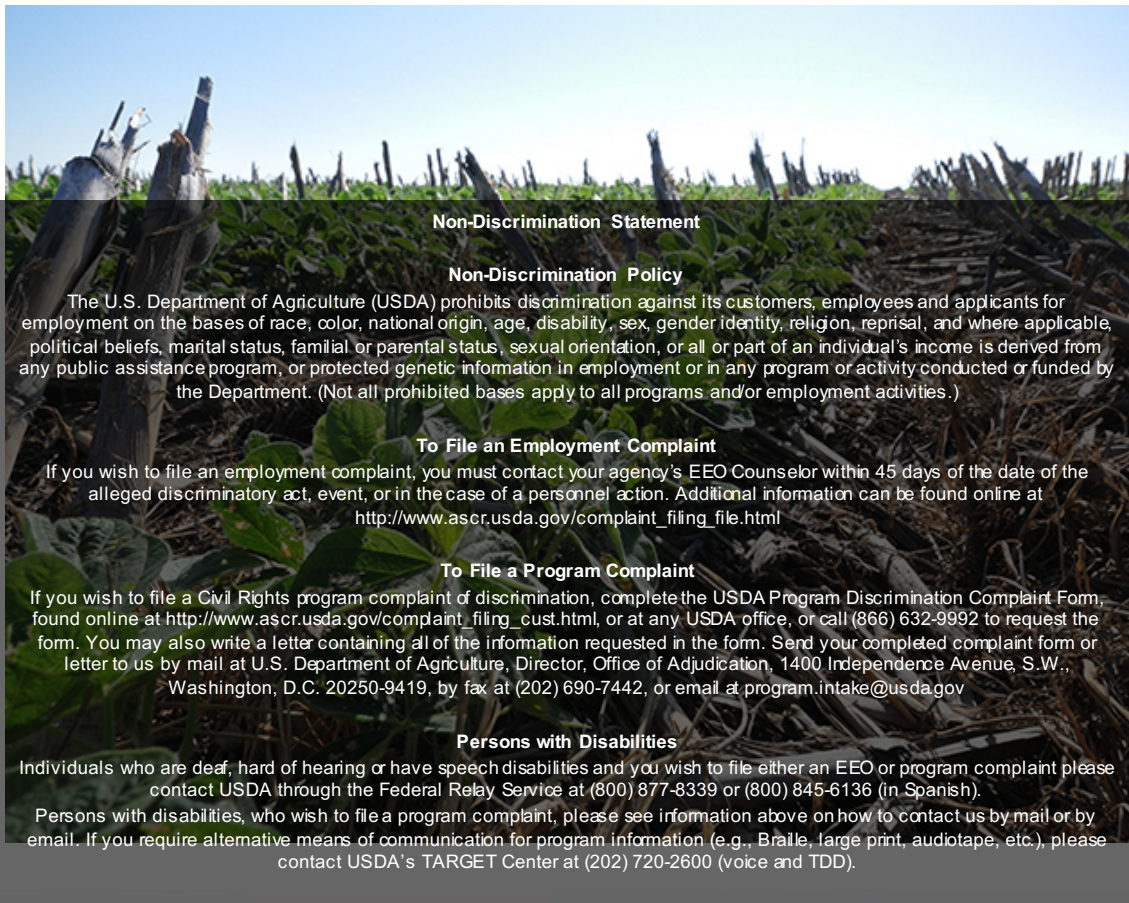
National USDA-NRCS Soil Health Division



Symbol	Position
(D)	Division Director (D)
(NS)	National Technical Specialist (NS)
(NL)	National Team Leader (NL)
(L)	Regional Team Leaders (L)
(S)	Soil Health Specialists (S)



United States Department of Agriculture



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Natural
Resources
Conservation
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unlock the
SECRETS
IN THE
SOIL

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