

A role for HR in climate change education

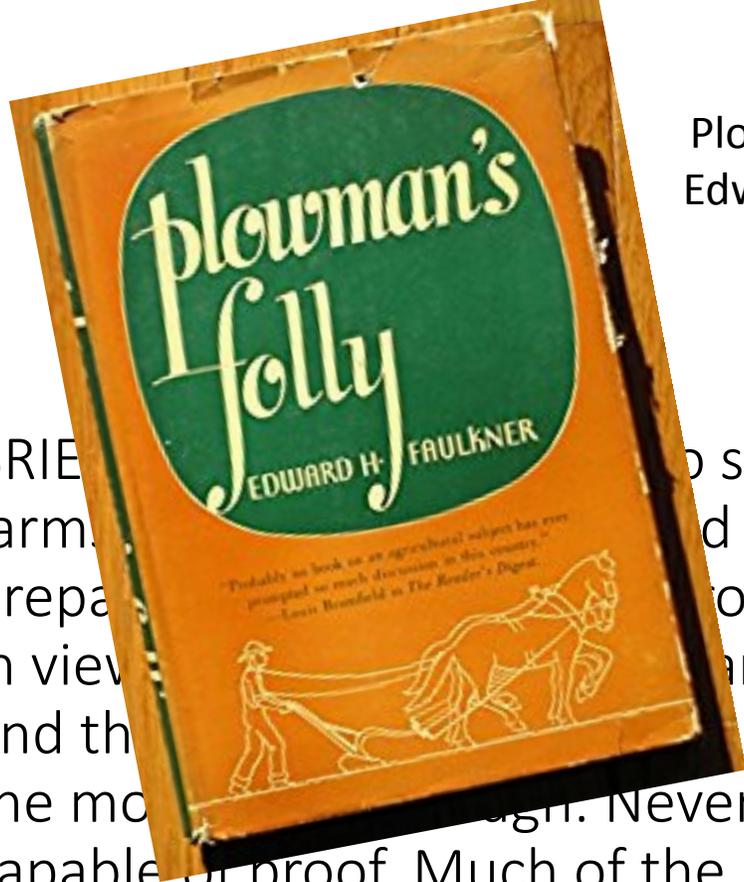
Jeff Mitchell

Integrating Climate Change in California Cooperative Extension Programs Workshop

Organized by the UC ANR Climate Change Program Team

February 6, 2018





Plowman's Folly
Edward Faulkner
1943

“...occupying 11th position all-time, a mere 4 spots behind Charles Darwin in the list of “Top Twenty Historical Monographs By Citation Counts” in soil science literature.....”

BRIEF to show that the mouldboard plough which is in use on farms in the world, is the least satisfactory implement for the preparation of crops. This sounds like a paradox, perhaps, in view of the fact that for nearly a century there has been a science of agriculture, and that almost to a man have used and approved the use of the mouldboard plough. Nevertheless, the statement made above is true and capable of proof. Much of the proof, as a matter of fact, has come in left-handed manner from scientists themselves. **The truth is that no one has ever advanced a scientific reason for ploughing.** Many learned teachers have had embarrassing moments before classes of students demanding to be shown why it would not be better to introduce all organic matter into the surface of the soil than to bury it, as is done by the plough.

“Agriculture has not had enough heresy.”
Jack, 2007



Enhancing Productivity
in a Changing Climate



Joint with the Canadian Society of Agronomy

Browse by Division of Interest | The 2018 program is in development and will be finalized mid-July.

ASA and CSSA International Annual Meeting: Programs

ASA Section: Land Management and Conservation

- Agricultural Experiment Station Management Community
- Cover Crop Management Community
- Military Land Use and Management Community
- Soil Health Community



Transcript of Morrill Act (1862)

Chap. CXXX.--AN ACT Donating Public Lands to the several States and Territories which may provide Colleges for the Benefit of Agriculture and Mechanic Arts.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each State a quantity equal to thirty thousand acres for each senator and representative in Congress to which the States are respectively entitled by the apportionment under the census of eighteen hundred and sixty: *Provided*, That no mineral lands shall be selected or purchased under the provisions of this Act.

SEC. 2. *And be it further enacted*, That the land aforesaid, after being surveyed, shall be apportioned to the several States in sections or subdivisions of sections, not less than one quarter of a section; and whenever there are public lands in a State subject to sale at private entry at one dollar and twenty-five cents per acre, the quantity to which said State shall be entitled shall be selected from such lands within the limits of such State, and the Secretary of the Interior is hereby directed to issue to each of the States in which there is not the quantity of public lands subject to sale at private entry at one dollar and twenty-five cents per acre, to which said State may be entitled under the provisions of this act, land scrip to the amount in acres for the deficiency of its distributive share: said scrip to be sold by said States and the proceeds thereof applied to the uses and purposes prescribed in this act, and for no other use or purpose whatsoever: *Provided*, That in no case shall any State to which land scrip may thus be issued be allowed to locate the same within the limits of any other State, or of any Territory of the United States, but their assignees may thus locate said land scrip upon any of the unappropriated lands of the United States subject to sale at private entry at one dollar and twenty-five cents, or less, per acre: *And provided, further*, That not more than one million acres shall be located by such assignees in any one of the States: *And provided, further*, That no such location shall be made before one year from the passage of this Act.

SEC. 3. *And be it further enacted*, That all the expenses of management, superintendence, and taxes from date of selection of said lands, previous to their sales, and all expenses incurred in the management and disbursement of the moneys which may be received therefrom, shall be paid by the States to which they may belong, out of the Treasury of said States, so that the entire proceeds of the sale of said lands shall be applied without any diminution whatever to the purposes hereinafter mentioned.

SEC. 4. *And be it further enacted*, That all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sales of land scrip hereinbefore provided for, shall be invested in stocks of the United States, or of the States, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished, (except so far as may be provided in section fifth of this act,) and the interest of which shall be inviolably appropriated, by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.

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KEARNEY AGRICULTURAL CENTER
9240 South Riverbend Avenue
Parlier, California 93648
(209) 846-6500
(209) 846-6993

October 26, 1998

To: Kevin Collins (209) 866-5666

REMINDER

OPPORTUNITIES FOR CONSERVATION TILLAGE IN THE WEST SIDE OF THE SJV

*(Discussion of possible on-farm
demonstration and research project)*

Friday

October 30, 1998

10:00 am - noon

University of California

West Side Research and Extension Center

Corner of Oakland and Lassen Avenues

Five Points, CA (209) 884-2411



WELCOME
to
**BENEFITS OF Soil Management
for Farming Systems**

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CHAMPIONS OF CHANGE
One Voice Can Change the World

SEE THE BLOG

THE LATEST | NOMINATE

Sustainable and Climate-Smart Agriculture

Allen
producer in Lunenburg, member of the company, a based consulting

Keith Berns
Keith Berns and his brother Brian are co-owners and operators of Providence Farms, a 2,500-acre diversified family farming operation in

Larry Cundall
Larry Cundall, a Vietnam War Veteran and fourth generation rancher from Okaville, Wyoming, is a leader in his ranching community. His priority is

<https://www.whitehouse.gov/blog/2015/10/27/acting-climate-through-sustainable-agriculture-white-house-champions-change>

the WHITE HOUSE PRESIDENT BARACK OBAMA

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HOME

Acting on Climate through Sustainable Agriculture: White House Champions of Change

OCTOBER 27, 2015 AT 8:28 PM ET BY ANGELA BARRANCO

Summary: The White House honors 12 farmers, producers and educators who are making an impact in the fight against climate change.

On Monday, the White House honored 12 Champions of Change for Sustainable and Climate-Smart Agriculture who are implementing practices to reduce greenhouse gas emissions and improve environmental conditions while sustaining local economies. In panel discussions at the White House, the Champions shared the techniques they are using on their farm such as planting cover crops, practicing no-till, installing biodigestors, and optimizing nutrient application.

The Champions all recognize the important role that our nation's farmers, ranchers, and agricultural educators can play in addressing climate change. Their actions build on the U.S.



- Soil care -
Farmers observing changes
in soil quality
Firebaugh, CA 2006



University of California
Agriculture & Natural Resources

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soil
Carbon
coalition

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California Farm Demonstration Network

cdfa
CALIFORNIA DEPARTMENT OF
FOOD & AGRICULTURE

CAFF
COMMUNITY ALLIANCE
WITH FAMILY FARMERS

CAN
CLIMATE ACTION NETWORK

Sustainable Conservation

NRCS

WILCOX
AGRI-PRODUCTS

RESOURCE
CONSERVATION DISTRICTS

Now is the time to make this happen.

Shared common goals

- Achieving **healthy soils** in California (NRCS)
- **Reducing GHG emissions** and **increasing water use efficiency** (CDFA)
- **Increasing production efficiencies** and **improving overall health of California's people and resources** (UC ANR), and
- **Informing and empowering local community development** (CARCD)
- **Increasing profitability** and **heading off regulations** (CFBF), and
- **Increasing engaged scholarship** and **research impact** (UCD)

In clear and specific ways, we are quite literally “all in this together.”

Creation of a specific means to accomplish these joint goals, -

increase the adoption of conservation agriculture, healthy soil and climate-smart systems in California via a statewide network in which local discovery, demonstrations of improved performance systems, learning, and communication are shared,

... to connect and expand

Partners in the process

- Tony Rolfes, Jim Komar, Carol Mandel, Rob Roy, Margaret Smither-Kopperl, Dennis Chessman, Erica Linqvist, Joe Williams, Kabir Zahangir, Sid Davis, Robert Vlach, Wendy Krehbiel, Johnnie Siliznoff, Bob Fry, Genet Carstensen, **NRCS**
- Eric Kueneman, Judee Fisher, Ron Harben, Jerry Rossiter, Alan Wilcox, Monte Bottens, **CASI**
- Karen Buhr, Chris Gardener, Kristen Murphy, Jeff Borum, Kandi Manhart, Greg Baker, **CARCD**
- Michelle Leinfelder-Miles, Betsy Karle, Marsha Campbell, Dan Munk, Gene Miyao, Deborah Giraud, Dani Lightle, Will Horwath, Kate Scow, Howard Ferris, Randy Southard, Glenn McGourty, Sat Khalsa, Gary Sposito, Peter Nico, Jeff Mitchell, **UC**
- Jesse Sanchez, Tom Barcellos, Dino Giacomazzi, John Diener, Tom Willey, Alan Sano, Darrell Cordova, Michael Crowell, Steve Samra, Rich Collins, John Teixeira, Scott Park, **Farmers**
- Ami Gunasekara, Karen Ross, Jenny Lester-Moffett, **CDFA**
- Garrett Liles, **CSU Chico**



**SHOWCASING OF
EXISTING
EXPERIENCE**

- focused on experienced farmers
- public sharing

**EDUCATION, COMPILATION OF
KNOWLEDGE AND EXPERIENCE,
AND SHARING OF KNOWLEDGE**

- development of content and
information sharing activities

**CLIMATE-SMART
AGRICULTURE DECISION
TOOL GUIDANCE AND
SUPPORT**

**FARM DEMONSTRATION
EVALUATIONS**

- implementation of conservation
agriculture practices and systems
by new wave of farmers
- showcasing of practical learning
- connecting people in productive
local efforts

**FARM DEMONSTRATION
PERFORMANCE MONITORING**

- development, testing,
of performance-monitoring metrics

**ONLINE DATA AND
INFORMATION SHARING**

Some challenging topics for ANR
with problems associated with them

Soil Health Profile, David Brandt



On October 11, 2012, at the Carroll, OH farm of long-time no-till and cover crop farmer, David Brandt, USDA's Natural Resources Conservation Service (NRCS) launched "*Unlock the Secrets in the Soil*," a major, national education and awareness campaign about soil health.

Ohio soil health pioneer forges new frontier in farming

While David and Kendra Brandt like what they see from the soil health system they're using on their central Ohio farm, everything they do still has to pass muster through the combine's yield monitor.

They've used no-till on their corn, wheat, and soybean operation since 1971, but when David saw a drop in corn yields in 1978, he added hairy vetch and winter peas to the system to get more nitrogen.

"We were using commercial nitrogen then, and I wasn't really thinking about the health of the soil," Brandt says. "We saw some improvement in water infiltration at the time, but we didn't reduce nitrogen inputs until we learned our soils were changing and we didn't really need it," he says.

Reducing Crop Inputs

"Cutting back on commercial inputs has been a tough one for me, because we've always been taught we need so many pounds of nitrogen, phosphorus and potash to grow a decent corn crop," Brandt says. "We're learning now with cover crops that we don't need to buy those additional nutrients because we can bring them up from deeper in the soil. They just weren't available to the crop before."

"In fact, we've learned in the last two years that we can go to using almost no purchased commercial fertilizer or herbicide and still produce a great crop of corn and beans."

Managing for soil health ...

- **Minimizing soil disturbance**
- **Maximizing the diversity of plants in rotation / cover crops**
- **Keeping living roots in the soil as much as possible, and**
- **Keeping the soil covered with plants and plant residues at all times**

Unlock the Secrets in the Soil

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health/>

7 annual crop farms in CA



FARMERS DO THEIR SHARE TO CLEAN THE AIR



*America's Private Lands
Conservation Agency*

NO TILL FARMING
WWW.SICRCD.ORG



**SAN JOAQUIN COUNTY
RESOURCE
CONSERVATION DISTRICT**



“rambunctious”

“We think you’re going too fast.”

“Aren’t we too early with this?”



January 25, 2018
Louisville, KY

ANRUpdate@ucanr.edu Jeffrey Mitchell
Climate video data questioned

Unsubscribe



Dear Colleagues,

The University of California and [VOX Media](#) have been producing a video series this past year that explores issues related to global climate change and UC's work to mitigate its effect on power, goods movement and more. Episode 8, "[The diet that helps fight climate change](#)," compares the greenhouse gas emissions of livestock and transportation globally, using son

Data – and the way in which it is presented – matters a great deal. Although the video stresses moderation and doesn't explicitly urge consumers to go vegan, it states that if the world offset the emissions from a billion cars on the road by 2050. For the U.S., however, this contention is misleading, as the impact would be considerably smaller.

It's true that livestock emit methane and nearly all aspects of agriculture have a carbon footprint; however, U.S. animal agriculture is much more efficient than in other parts of the world. In the U.S., livestock are responsible for 3.8 percent of GHG emissions while transportation accounts for 26.4 percent, according to [U.S. Environmental Protection Agency data](#). In California, 5.4 percent of GHG emissions are attributed to livestock and 37 percent to transportation, according to the [California Air Resources Board](#).

While it is vital that scientists in UC ANR, and elsewhere, assist ranchers to continue diminishing the [carbon hoofprint](#), it is also important to recognize that meat can serve as a high-quality protein source as part of a nutritious diet. The VOX video does note that not all livestock is raised equally, and that rangeland can be used to sequester carbon, but it neglects to mention that grazing cows also provide numerous ecosystem services, such as eating plants that could fuel wildfires.

It should also be noted how livestock fit into the larger food system picture. Almost 60 percent of the world's agricultural land is grazing land and is unsuitable for producing crops. Ruminants serve a valuable role in the food system by converting the forages humans cannot consume into a nutrient-dense food.

UC ANR advisors and specialists continuously strive to improve livestock production practices; however, that is only one of many approaches we need to pursue to solve the challenges of climate change. Time, research and money should be invested where they will produce the most benefit for society. Encouraging people to focus on livestock, rather than on much larger sources of GHG emissions, can lead to policies that slow our efforts to develop more effective climate change solutions.

Glenda Humiston
Vice President

View or leave comments for ANR Leadership at <http://ucanr.edu/sites/ANRUpdate/Comments>.

This announcement is also posted and archived on the [ANR Update pages](#).

ACTION FROM MULTIPLE FRONTS TO FEED 11 BILLION

- | | | |
|--|--|--------|
| 1. Increase production from existing land & restoring soils: | : Sustainable Intensification (SI) | |
| 2. Reduce post-harvest losses | : 10-40% (Developing countries) | |
| 3. Minimize food waste (farm → fork → landfill) | : 20-40% (Developed countries) | |
| 4. Reduce diversion of food to biofuels | : ~1/3 of corn in U.S. | |
| 5. Prefer plant-based diet | : 6-8 kg grain/kg of meat on grain-fed livestock | } Diet |
| 6. Per capita grain consumption | : India= 170 kg/yr
USA = 635 kg/yr | |

Lal, 2013

Where does this go from here?

Air

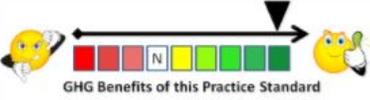
- Air Quality
- USDA Agricultural Air Quality Task Force**

Areas Of Focus

- National Air Quality Initiative FY16 Practice List

GHG and Carbon Sequestration Ranking Tool

NRCS Practice Standards for Greenhouse Gas Emission Reduction and Carbon Sequestration

Qualitative Ranking N = Neutral	Practice Code	Practice Standard and Associated Information Sheet	Beneficial Attributes
 <p>GHG Benefits of this Practice Standard</p>	327	Conservation Cover	Establishing perennial vegetation on land retired from agriculture production increases soil carbon and increases biomass carbon stocks.
	329	Residue and Tillage Management, No-Till/Strip-Till/Direct Seed	Limiting soil-disturbing activities improves soil carbon retention and minimizes carbon emissions from soils.
	366	Anaerobic Digester	Biogas capture reduces CH ₄ emissions to the atmosphere and provides a viable gas stream that is used for electricity generation or as a natural gas energy stream.
	367	Roofs and Covers	Capture of biogas from waste management facilities reduces CH ₄ emissions to the atmosphere and captures biogas for energy production. CH ₄ management reduces direct greenhouse gas emissions.
	372	Combustion System Improvement	Energy efficiency improvements reduce on-farm fossil fuel consumption and directly reduce CO ₂ emissions.
	379	Multi-Story Cropping	Establishing trees and shrubs that are managed as an overstory to crops increases net carbon storage in woody biomass and soils. Harvested biomass can serve as a renewable fuel and feedstock.
	380	Windbreak/Shelterbelt Establishment	Establishing linear plantings of woody plants increases biomass carbon stocks and enhances soil carbon.

USDA NRCS List of Practices:

<https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/air/quality/?cid=stelprdb1044982>

From: Hatfield, Jerry [mailto:Jerry.Hatfield@ARS.USDA.GOV]
Sent: Thursday, January 25, 2018 5:20 AM
To: Jeffrey Mitchell <jpmitchell@ucdavis.edu>
Subject: Re: Your advice, direction and guidance are needed, Jerry.

Jeff,

For CO₂ in Soil, it is all about reducing tillage, adding more active residue (cover crops), diversifying rotations.

For CH₄, it is about managing manure. Digesters are probably the best concept. Soils are not very dynamic

For N₂O, the use of stabilizers on fertilizers. If we link water management with improved soil that sequesters C, there will be less emission of both GHGs

I am out until Feb 5 on vacation

J

Review of research to inform California's climate scoping plan: Agriculture and working lands

California's diverse agricultural systems offer a range of opportunities for reducing climate-warming emissions.

by Ryan Byrnes, Valerie Eviner, Ermias Kebreab, William R. Horwath, Louise Jackson, Bryan M. Jenkins, Stephen Kaffka, Amber Kerr, Josette Lewis, Frank M. Mitloehner, Jeffrey P. Mitchell, Kate M. Scow, Kerri L. Steenwerth and Stephen Wheeler

Abstract

Agriculture in California contributes 8% of the state's greenhouse gas (GHG) emissions. To inform the state's policy and program strategy to meet climate targets, we review recent research on practices that can reduce emissions, sequester carbon and provide other co-benefits to producers and the environment across agriculture and rangeland systems. Importantly, the research reviewed here was conducted in California and addresses practices in our specific agricultural, socioeconomic and biophysical environment. Farmland conversion and the dairy and intensive livestock sector are the largest contributors to GHG emissions and offer the greatest opportunities for avoided emissions. We also identify a range of other opportunities including soil and nutrient management, integrated and diversified farming systems, rangeland management, and biomass-based energy generation. Additional research to replicate and quantify the emissions reduction or carbon sequestration potential of these practices will strengthen the evidence base for California climate policy.

California has committed to cutting greenhouse gas (GHG) emissions by 40% of 1990 levels by 2030. As a sector, agriculture is responsible for 8% of state emissions. Approximately two-thirds of that is from livestock production (manure management and enteric fermentation); 20% from fertilizer use and soil management associated with crop production; and 13% from fuel use associated with agricultural activities (e.g., irrigation pumping, cooling or heating commodities) (CARB 2017a). California plays an essential role in the nutritional quality of our national food system, accounting for, by value, roughly two-thirds of U.S. fruit and nut production, half of U.S. vegetable production and 20% of U.S. dairy production.

Assembly Bill 32, California's primary climate policy law, adopted in 2006, has spurred research into practices and technologies that could assist in reducing emissions and sequestering carbon. Here we report on

Online: <https://doi.org/10.3733/ca.2017a0031>

Priorities for future research

Here we identify cross-cutting priorities that will enable scaling and, equally important, the integration of multiple practices to achieve more substantial progress toward both climate change mitigation and adaption in agriculture. Among the priorities we identify are:

- Replication and longer-term studies to quantify the GHG mitigation or carbon sequestration associated with specific practices.
- Quantification of synergies from stacking multiple practices over time and scale (e.g., field to region)
- To address efficacies for carbon sequestration, emissions reductions and nitrogen use.
- Characterization and, where possible, quantification of co-benefits (water, economic, air quality) from soil management practices, livestock grazing and manure management, and biomass-based fuels.
- Using social and political science research to identify socioeconomic factors that either create barriers or promote adoption of practices (e.g., social networks, gender, social norms, and values).
- Validation of metrics for soil health parameters, including calibration of models for California conditions that may be used to estimate metrics, such as:
 - Potential use of remote sensing to measure adoption of specific practices outlined above.
 - Validation and/or calibration of models for estimating GHG emissions, including the crop and soil process model, DAYCENT (Del Grosso et al. 2005), and the USDA's whole farm and ranch carbon and GHG accounting system, which uses the DAYCENT model (COMET-Farm; <http://cometfarm.nrel.colostate.edu/>).
 - Research into the design of incentives (such as payments, tax credits, low interest loans, etc.) to leverage private investment and promote adoption of emissions-reduction practices in agriculture.
 - Development of metrics and sampling or survey tools to assess adoption of emissions-reduction practices.
 - Development of farmer demonstration and evaluation networks for scaling up the adoption of improved performance systems.

Byrnes et al., 2017, *Cal Ag*, 71(3):160-167

Converting farmland and rangeland to residential and urban uses results in a net increase of greenhouse gas emissions. Reducing the rate of conversion helps to avoid such emissions.

NATIONAL CONFERENCE ON COVER CROPS & SOIL HEALTH HARVESTING THE POTENTIAL

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Search this site

National Conference on Cover Crops and Soil Health Harvesting the Potential February 17-19, 2014 Hilton Omaha Hotel, Omaha, Nebraska

Thank you for attending the conference!

Crops and Soil Health brought together 300 agriculture leaders and innovators to explore how we can make American agriculture more sustainable. Attendees represented agriculture industry, the farm community, academia, government, commodity and conservation organizations.

The National Conference on Cover Crops and Soil Health forms took place February 18 at over 200 Natural Resources and Conservation Services (NRCS) and Extension offices and other agricultural professionals the opportunity to send their thoughts to the national conference and engage in local conversations on cover crops and soil health. Forums were attended by an estimated 6,000 people.

Videos of the opening panel sessions may now be found at online at <http://www.sare.org/Events/National-Conference-on-Cover-Crops-and-Soil-Health>

Logistics for this meeting are being managed by the Soil and Water Conservation Society. Please direct any questions to events@swcs.org.

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"Training the trainers" how to talk to farmers about cover crops.

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REGARDLESS OF HOW GREAT a change in agricultural methods may sound, it will remain just a theory, collecting dust on a shelf, until the farmer commits to put it into practice. Cover Crop Coaching teaches agriculture influencers how to train farmers in the effective use of cover cropping.

MANY INNOVATIVE FARMERS have already integrated cover crops into their farming systems. There is now a clear need for the vast middle of the road or "early majority" farmers to be trained in effective cover crop use. Cover Crop Coaching provides the proper mindset, principles, and practical tools for a trainer to teach the farmer how to make proven cover crop decisions that will result in success!

Cover Crop Coaching

was founded by Steve Groff, a farmer who is widely known and highly respected as a cover crop pioneer, innovator, and educator.

His first-hand experience and insatiable curiosity about cover crops has made him one of the most highly sought after spokesmen and consultants regarding cover crop use. He has won numerous agricultural and speaking awards over the past 20 years.

Cover crops are still new to most farmers. Cover Crop Coaching has the history, expertise, and networks of resources that help build confidence for the trainers working with farmers who are just starting or want to expand their use of cover crops.



The Steve Groff family farm in Holtwood, PA, was chosen to represent the conservation methods extensively used there - namely no tillage and cover crops in an effort to reduce nutrient pollution in the Chesapeake Bay.



Not a Trainer?

**STRATEGIC PLAN
for the INCREASED ADOPTION OF CONSERVATION
AGRICULTURE SYSTEMS in CALIFORNIA**

What is the Conservation Agriculture Systems Innovation (CASI) Center?

Established in 1998, the **Conservation Agriculture Systems Innovation Center** (formerly the Conservation Tillage Workgroup) is a diverse group of over 2,100 farmer, University of California, California State University, USDA - NRCS, Resource Conservation District, public agency, private sector, and environmental group members that have come together to promote conservation cropping systems in California.

VISION

The vision of the **CASI Center** is to achieve resource-conserving and economically viable conservation agriculture systems in California. These systems contribute to more vibrant farm economies, greater production efficiencies, reduce negative environmental impacts, increase farm water use efficiency, and ease labor requirements.

MISSION

The mission of the **CASI Center** is to accelerate the adoption of conservation agriculture systems by California farmers.

CORE VALUES

- Agriculture is fundamentally important to California as well as to the nation and the world.
- Sustainable agriculture has significant environmental, economic, and societal value to California and requires support from many sectors of society including government, academia, and consumers.
- Long-term support is essential to achieving agriculture’s goals in California.
- California agriculture requires continual research and implementation of conservation agricultural systems to remain competitive and sustainable in world markets.
- Farmers are the key to achieving a sustainable agricultural industry and CASI is dedicated to the philosophy of farmer’s voluntary adoption of agricultural innovations.
- Demonstration of conservation agricultural systems on actual farms is the key to adoption of those innovative systems.
- Farmers require technical and financial support to adopt innovative conservation agricultural systems on their own farms.

- An informed and educated society is necessary to support sustainable California agriculture.
- CASI requires funding in order to achieve its core values.

STRATEGIC ISSUES

1. Increase the sustained adoption of conservation agricultural systems,
2. Develop and demonstrate the economic and environmental benefits of conservation agricultural systems,
3. Partner with national and international conservation organizations and serve as a clearing house for information to promote conservation agricultural systems, and
4. Increase funding for conservation agricultural systems research, education, demonstration, and adoption in California.

Strategic Issue 1: Increase the sustained adoption of conservation agricultural systems (NOTE: We may or may not want to have the 50% as a strategic issue or as a goal.)

Goals	Strategies	Desired Results
Increase the sustained adoption of conservation agricultural systems to more than 50% of cropping acreage by 2028.	Create the necessary support system <u>in order to</u> achieve goals	A self-sustaining shift to conservation agricultural systems in California.
Create a metric system for tracking the application of conservation agriculture systems	Enlist the assistance of the UC Davis Remote Sensing Lab to develop a procedure for inventorying the acreage of applied conservation agricultural systems	A repeatable, statistically sound method of verifying CASI’s progress toward achieving its goals
Create a network of knowledge-based, mobile research and training tools and programs on conservation agriculture, soil health, and precision irrigation	Establish regional stakeholder partnerships to identify conservation agriculture research and educational priorities aimed at improving cropping systems	Increased awareness and understanding by local stakeholders of long-term goals, causal pathways for change, and preconditions necessary for achieving goals
	Develop core curriculum for	An informed network of

Ideas for consideration

- Overcome HR roadblocks
- Find/work toward what we can agree upon
- Then, work these opportunities, principles, and practices into our programs
 - If 50 of us here X 50 presentations annually = 2500 discussion opportunities
- Look to new areas
- Consider setting goals

enterprise
NATIONAL GEOGRAPHIC
FIND YOUR DREAM ADVENTURE
WATCH NOW



Tomato production
No. 22 globally
 992,080 tons

Punching above its weight

The tiny Netherlands has become an agricultural powerhouse—the second largest global exporter of food by dollar value after the U.S.—with only a fraction of the land available to other countries. How has it achieved this? By using the world's most efficient agricultural technologies.

Yield
No. 1 globally
 144,352 tons per square mile

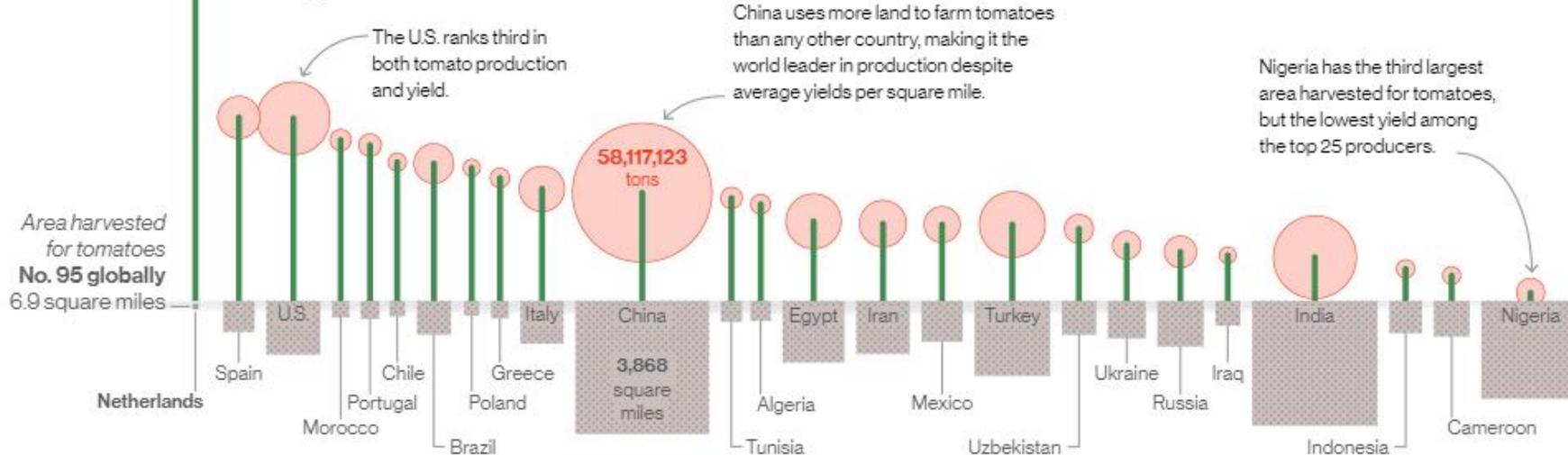
Harvesting impressive yields

Over the past 30 years, the Dutch tomato industry has become the world leader in yield, producing more tomatoes per square mile than anywhere else; the Netherlands enjoys high yields in other staple crops (right) as well.

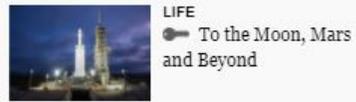
Top 25 producers by yield, 2014 in tons per square mile



Top 25 tomato producers, 2014 ranked by yield



Area harvested for tomatoes
No. 95 globally
 6.9 square miles



LIFE
To the Moon, Mars and Beyond



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Review: 'Clean Meat' Could Make Livestock Obsolete

Manufacturing meat without raising animals will soon shift from fantasy to reality. Early investors include Bill Gates, Richard Branson and Cargill Inc.—already the world's largest supplier of ground beef.

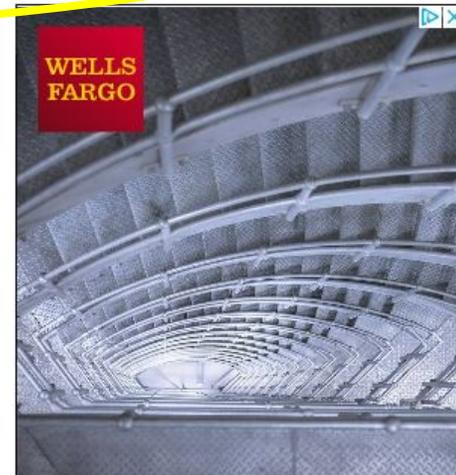
By *Matthew Scully*

Jan. 5, 2018 4:33 p.m. ET

Run through anyone's list of "disruptive" innovations in the works today and they begin to seem like small-time stuff as we contemplate "Clean Meat: How Growing Meat Without Animals Will Revolutionize Dinner and the World." Driverless cars, virtual reality, robots—these are interesting possibilities. But slaughter-free flesh for humanity, meat without misery, dinner without death: Now we're talking "transformational."

Who would not wish—all the more so if it meant giving up nothing—to make the abattoirs of the world fall silent?...

TO READ THE FULL STORY



Ideas for consideration

- Overcome HR roadblocks
- Find/work toward what we can agree upon
- Then, work these opportunities, principles, and practices into our programs
 - If 50 of us here today X 50 presentations annually = 2500 discussion opportunities
- Look to new areas
- Consider setting goals



Thank you.



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