The Road to Regenerative Agriculture

Danielle Treadwell and David Campbell
UF/IFAS Department of Horticultural Sciences

David Wright Symposium
October 14, 2022

A Brief History of (Ag) Time

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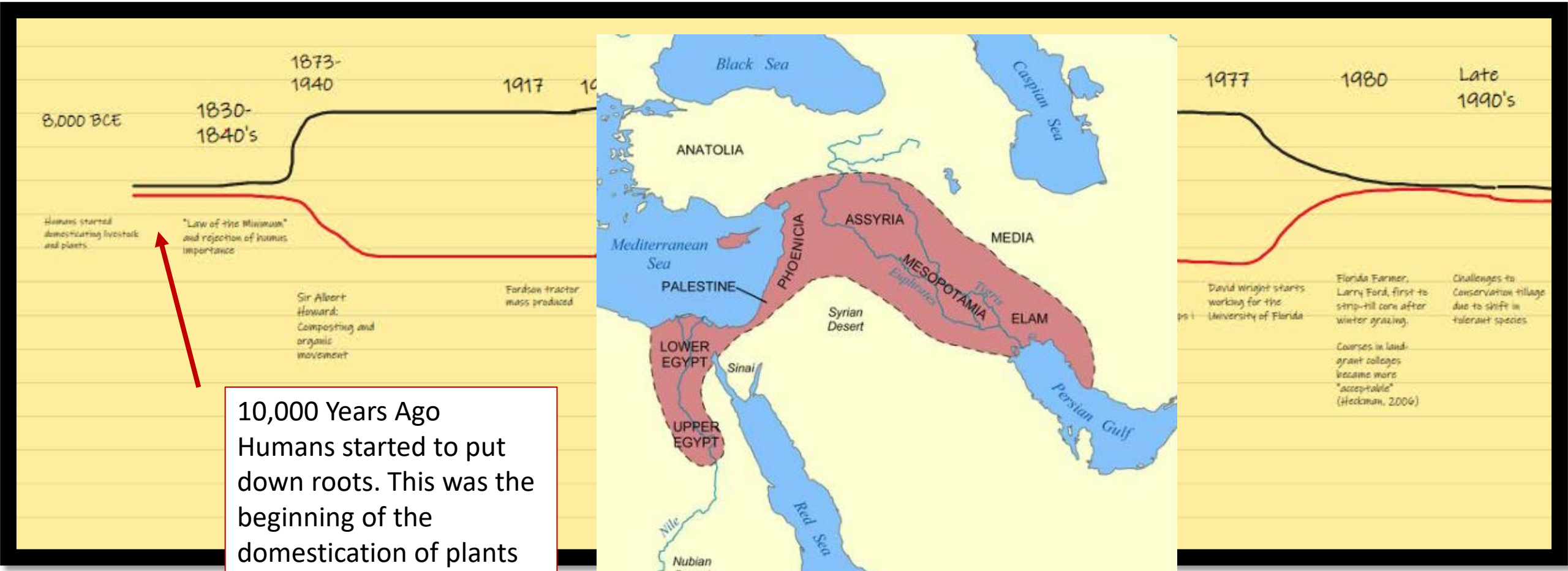
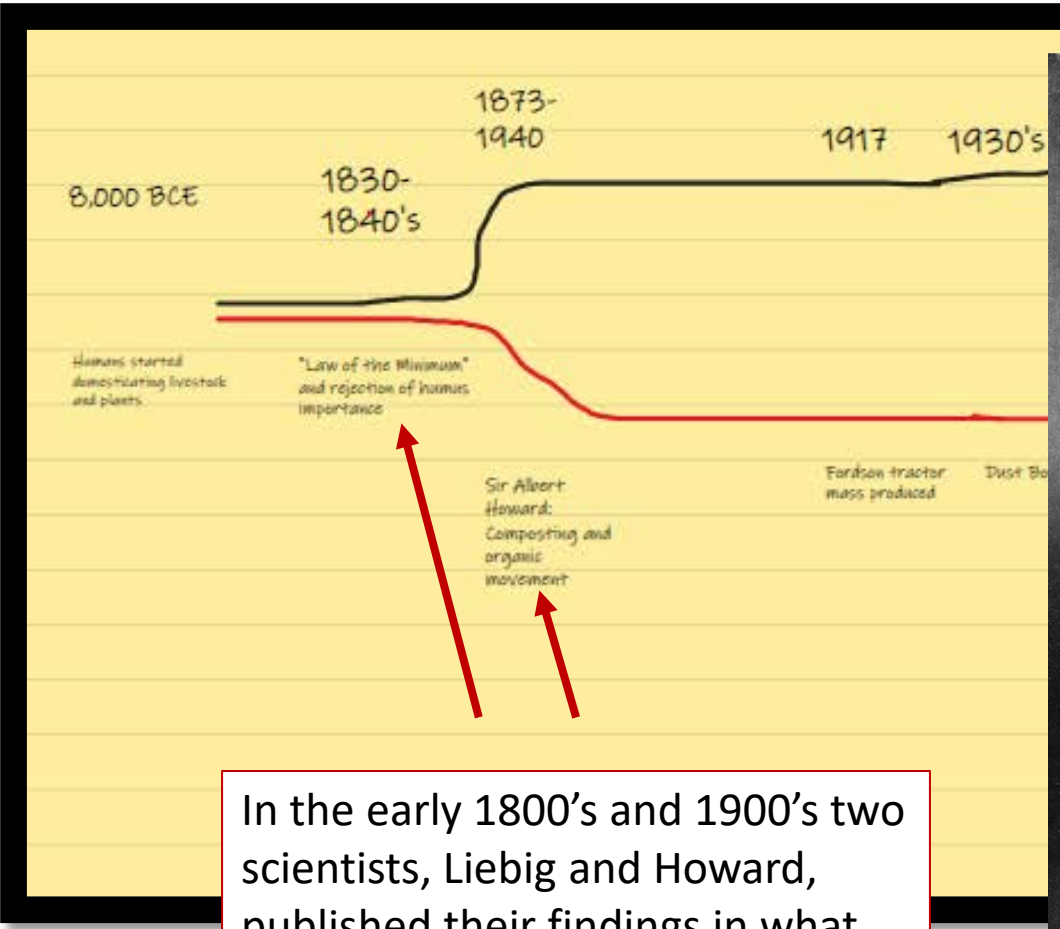
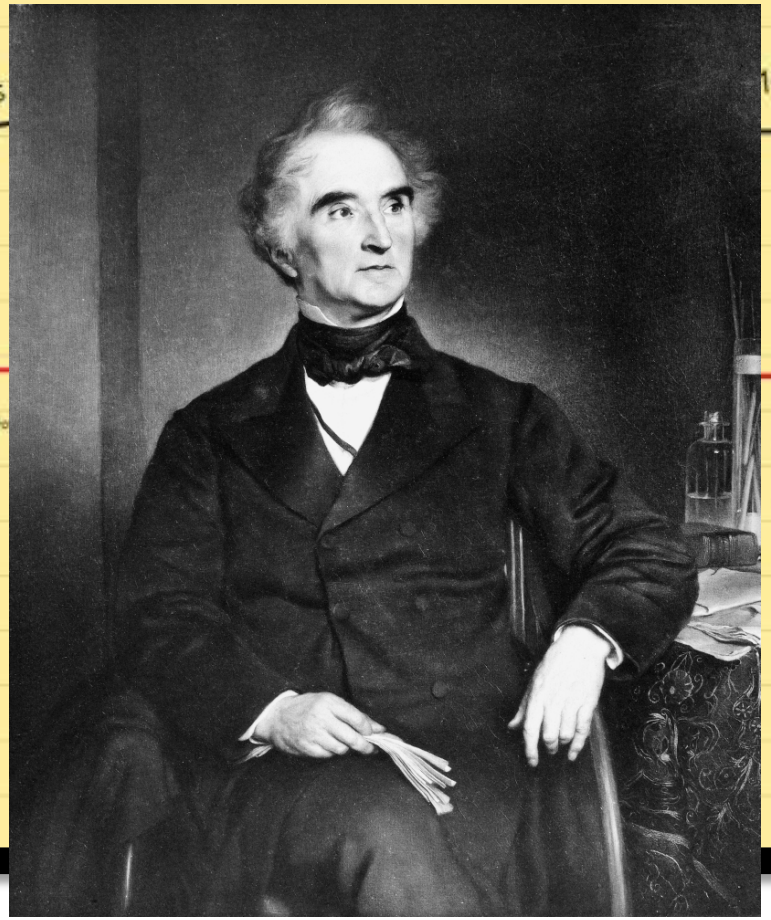


10,000 Years Ago
Humans started to put down roots. This was the beginning of the domestication of plants and animals, and the beginning of our journey.

A Brief History of (Ag) Time



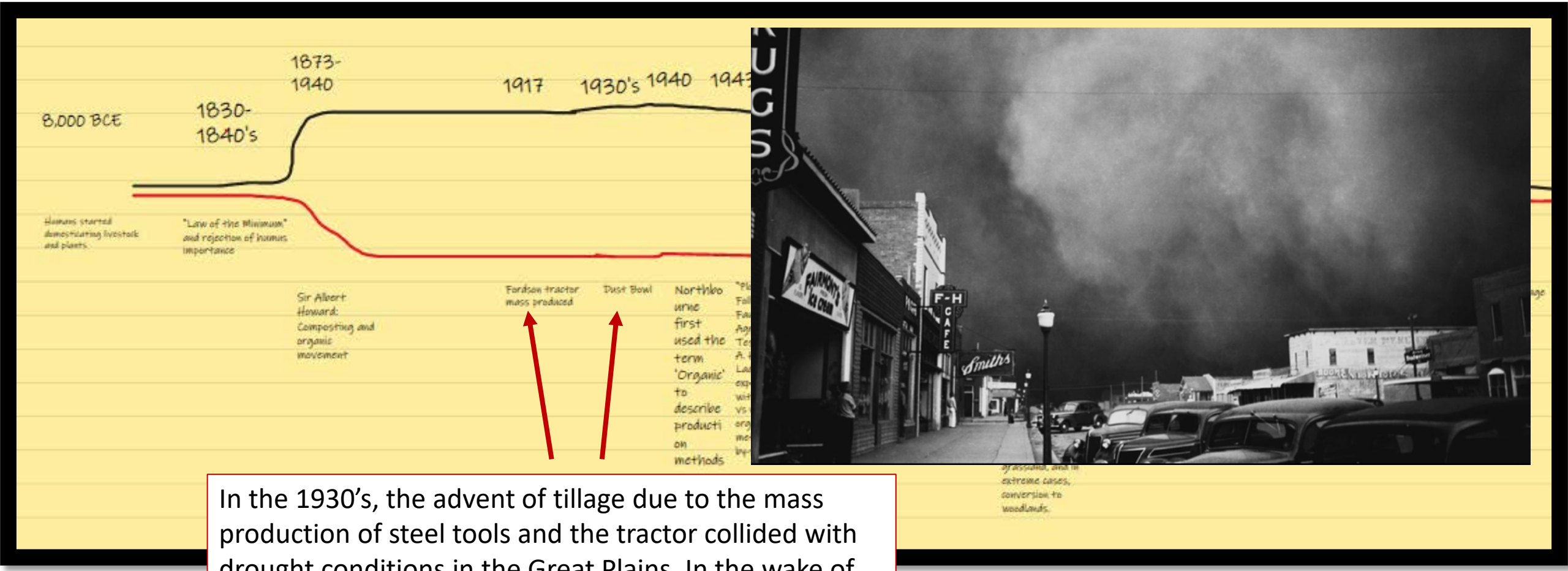
In the early 1800's and 1900's two scientists, Liebig and Howard, published their findings in what would become the foundation of divergent views – two different philosophies of nutrient management.



Justus Von Liebig

Sir Albert Howard

A Brief History of (Ag) Time

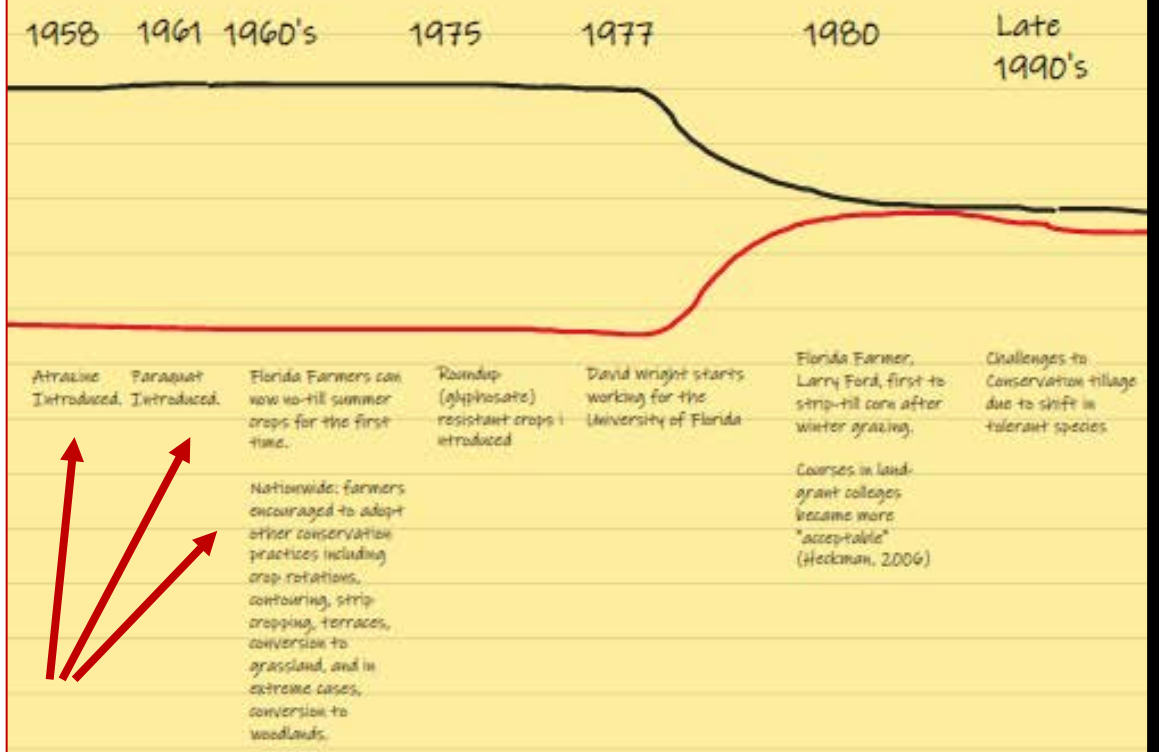


In the 1930's, the advent of tillage due to the mass production of steel tools and the tractor collided with drought conditions in the Great Plains. In the wake of significant soil and economic loss, Roosevelt established the civilian conservation core and the soil erosion service, later these would become NRCS.

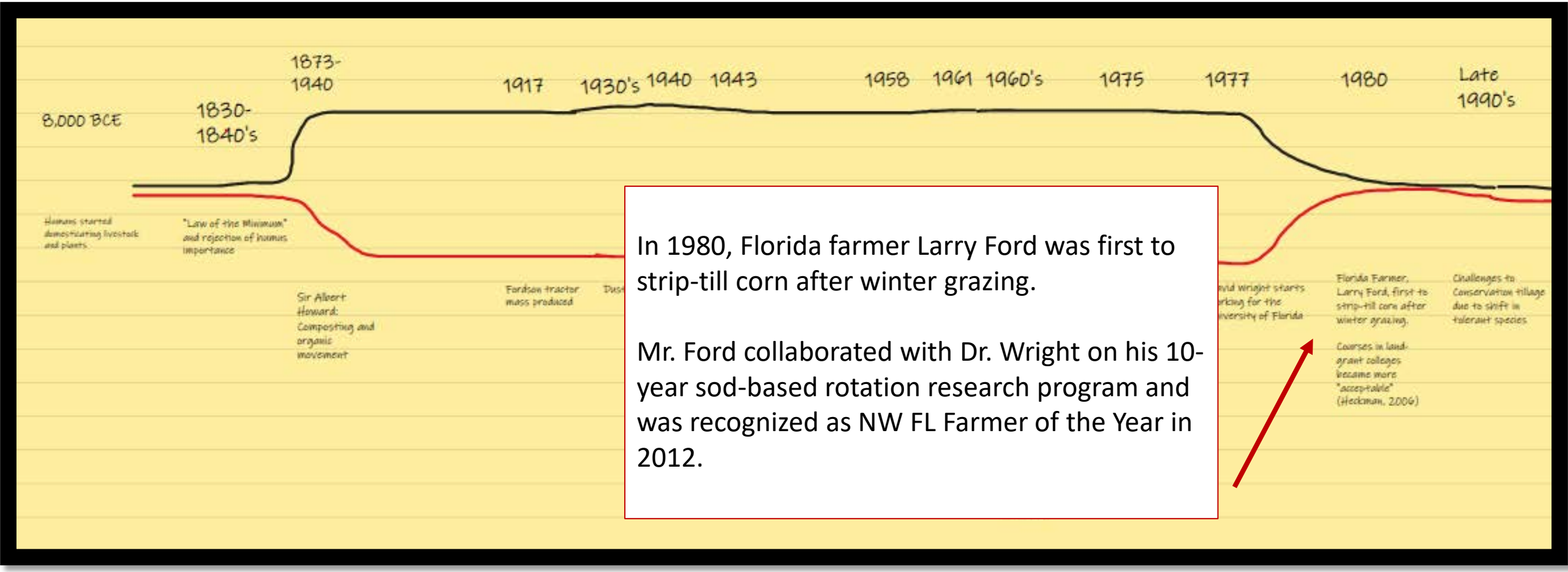
A Brief History of (Ag) Time

In the 1950's and 1960's, the ag industry expanded, and farms became more efficient. Mechanization replaced labor, and improved spray rigs applying Atrazine and Paraquat were integrated into cropping systems. Florida farmers could mow no-till summer cover crops for the first time.

By the '70's, conservation practices including no-tilling were supported by the release of glyphosate-resistant crops, and improved equipment such as Brown Manufacturing's strip till unit. Use of chemical pesticides was one driver of the organic agriculture movement.



A Brief History of (Ag) Time



In 1980, Florida farmer Larry Ford was first to strip-till corn after winter grazing.

Mr. Ford collaborated with Dr. Wright on his 10-year sod-based rotation research program and was recognized as NW FL Farmer of the Year in 2012.

Flashback to 1977

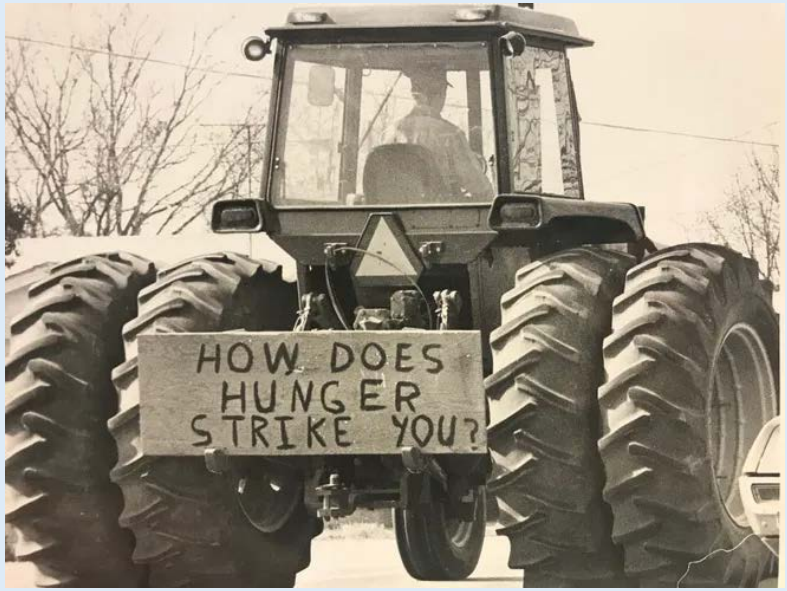
1st Space Shuttle Enterprise Test Flight

Fashion was questionable

January 6, 1977
Snow in Miami, FL

The Apple II

Food and Agriculture Act of 1977 (P.L. 95-113)



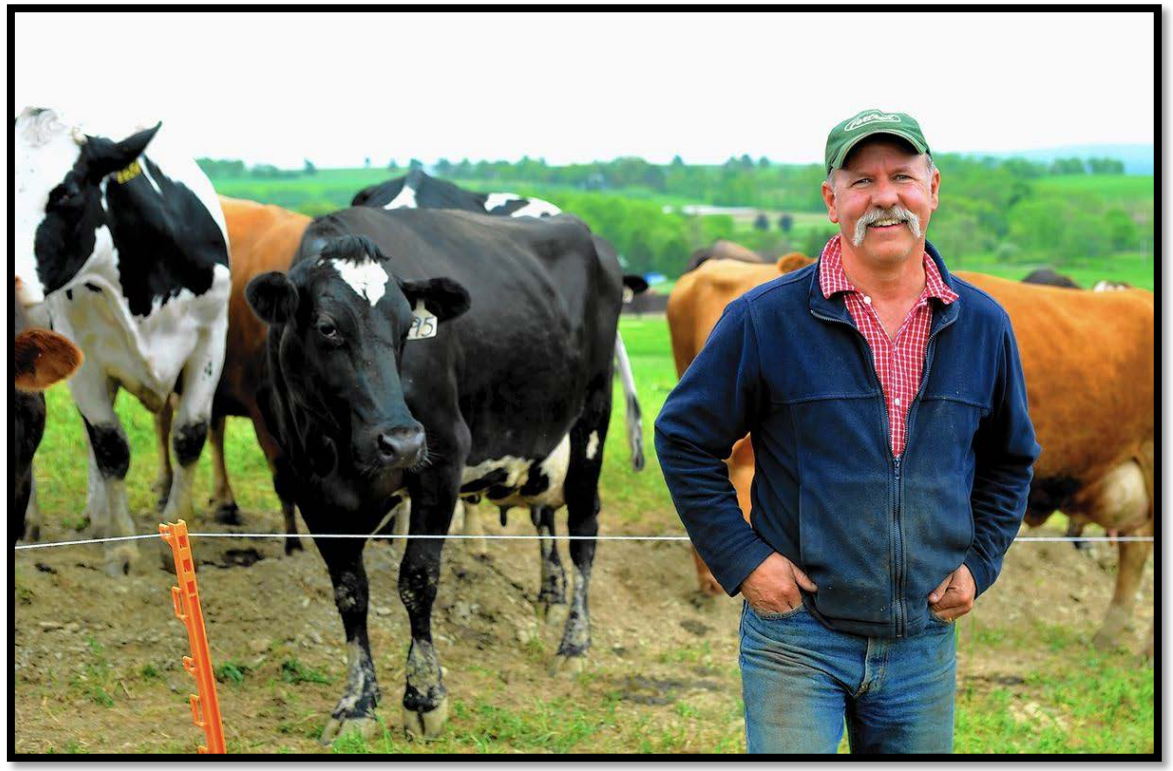
Nebraska Tractorcade 1977 – Farm Strike

Photo Credits: www.gosanangelo.com/

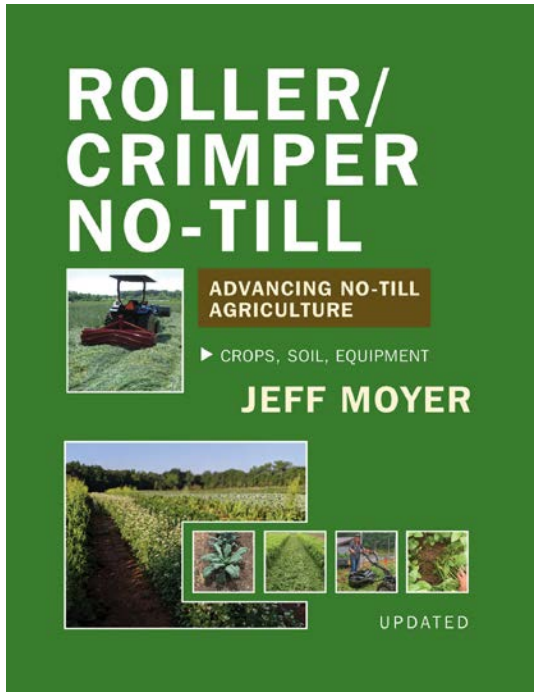
Alternative Agriculture

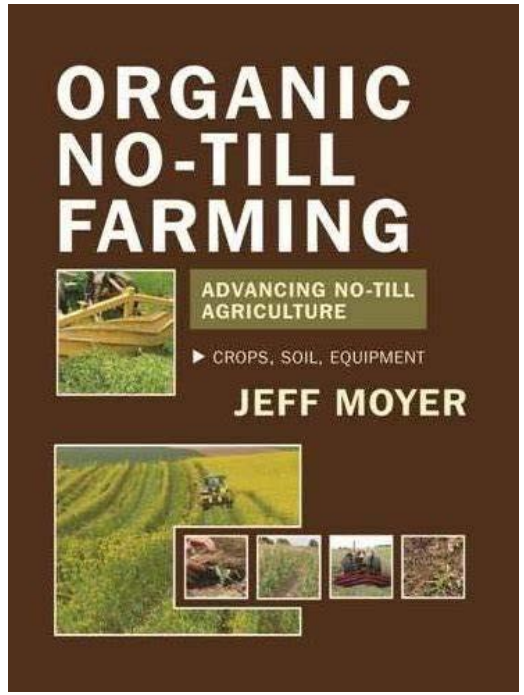
"The hallmark of an alternative farming approach is not the conventional practices it rejects but the innovative practices it includes."*-National Research Council, Alternative Agriculture (1989)*

Rodale and Acres USA Gave Clear Directions



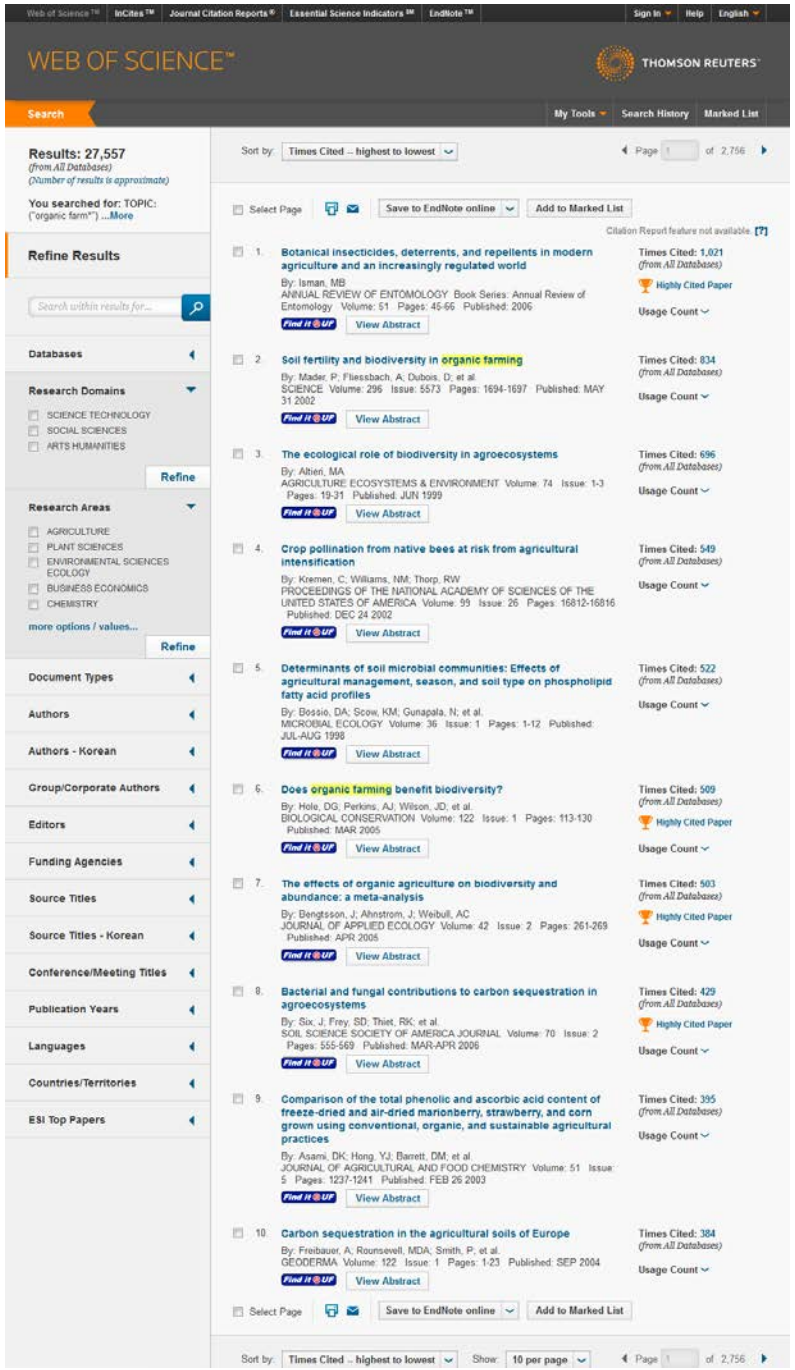
"I have great memories of eating boiled peanuts with David while throwing food into his pond to feed the alligator!"
- Jeff Moyer





USDA's National Organic Program

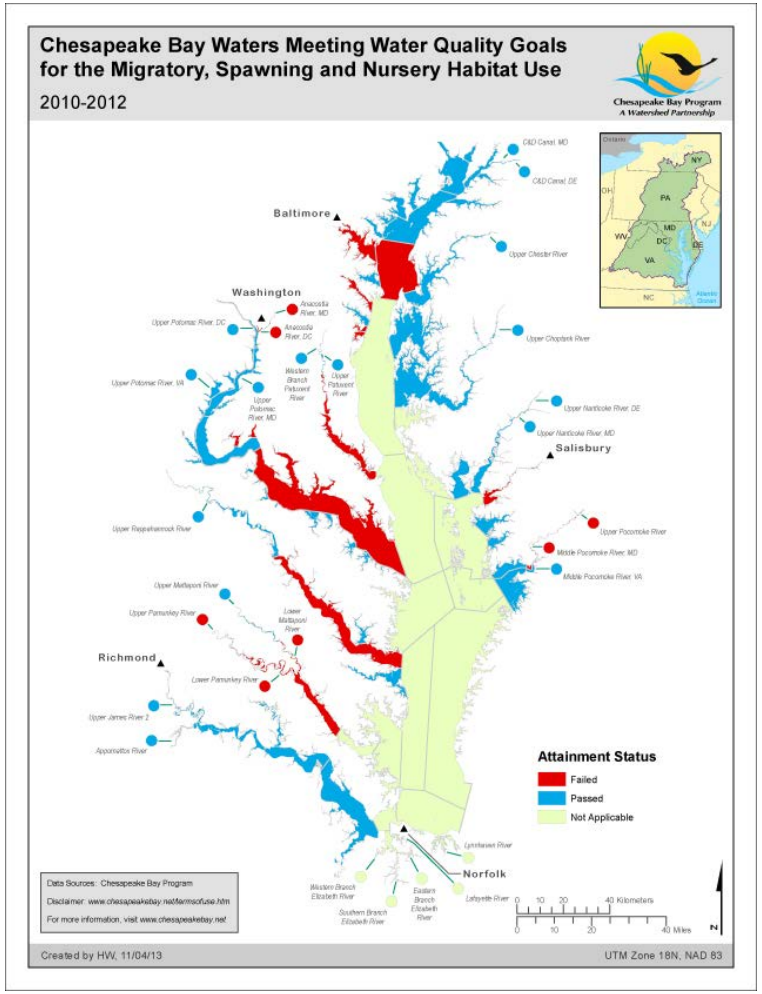
- Certified Organic farming systems are the only farming systems in the United States that
  - ➢ are REQUIRED by federal regulation to use an integrated package of management practices that maintain or improve the natural resources of the farm, including soil and water quality,
  - ➢ are REQUIRED to use preventative management practices to manage pests, and
  - ➢ are REQUIRED to undergo a rigorous annual oversight and certification process.



Science Explains Organic Systems

- This is a screen shot of the top 10 research articles with the greatest number of citations.
- Each article is from a different peer-reviewed journal.
- 66 new citations Jan 1 2016 – Feb 24 2016 “organic farm*” Web of Science; 27,557 citations in all.

Federal/State Programs That Include the National Organic Program



- National Organic Program
- NRCS Conservation Programs
- Federal Food Safety
- Commodity Marketing Orders
- Chesapeake Bay Cover Crop Practice Standard
- FL Dept. Agriculture and Consumer Services BMPs

Florida Agricultural Land Use changes between 2012 and 2017

Farm Size	Cropland with Intensive Tillage		Cropland with no-till		Cropland with reduced tillage, excluding no-till		Cropland with a cover crop (excluding CRP)		Land under conservation easement	
Acres	Farms	Acres	Farms	Acres	Farms	Acres	Farms	Acres	Farms	Acres
1 to 9	67%	72%	177%	204%	56%	78%	166%	n/a	104%	105%
10 to 49	83%	88%	141%	150%	92%	87%	109%	103%	89%	79%
50 to 99	66%	65%	145%	137%	90%	99%	107%	104%	88%	94%
100 to 199	88%	87%	185%	183%	95%	98%	122%	118%	131%	129%
200 to 499	82%	85%	164%	156%	135%	144%	80%	77%	138%	136%
500 to 999	91%	92%	80%	83%	174%	178%	77%	88%	116%	130%
1,000 to 1,999	90%	91%	75%	81%	200%	204%	104%	103%	82%	91%
2,000 +	88%	89%	130%	149%	229%	250%	300%	n/a	125%	153%
All	**75%**	**88%**	**159%**	**127%**	**79%**	**173%**	**127%**	**103%**	**103%**	**132%**
Total in 2017	**2,729**	**802,923**	**2,077**	**244,994**	**870**	**189,212**	**1,573**	**141,848**	**1,022**	**297,900**

Source: 2017 USDA Ag Census

Note: Highlighted data indicate an increase. Census data prior to 2012 combines all conservation practices such as wetland reserve, easements, etc.

Let's Create the System

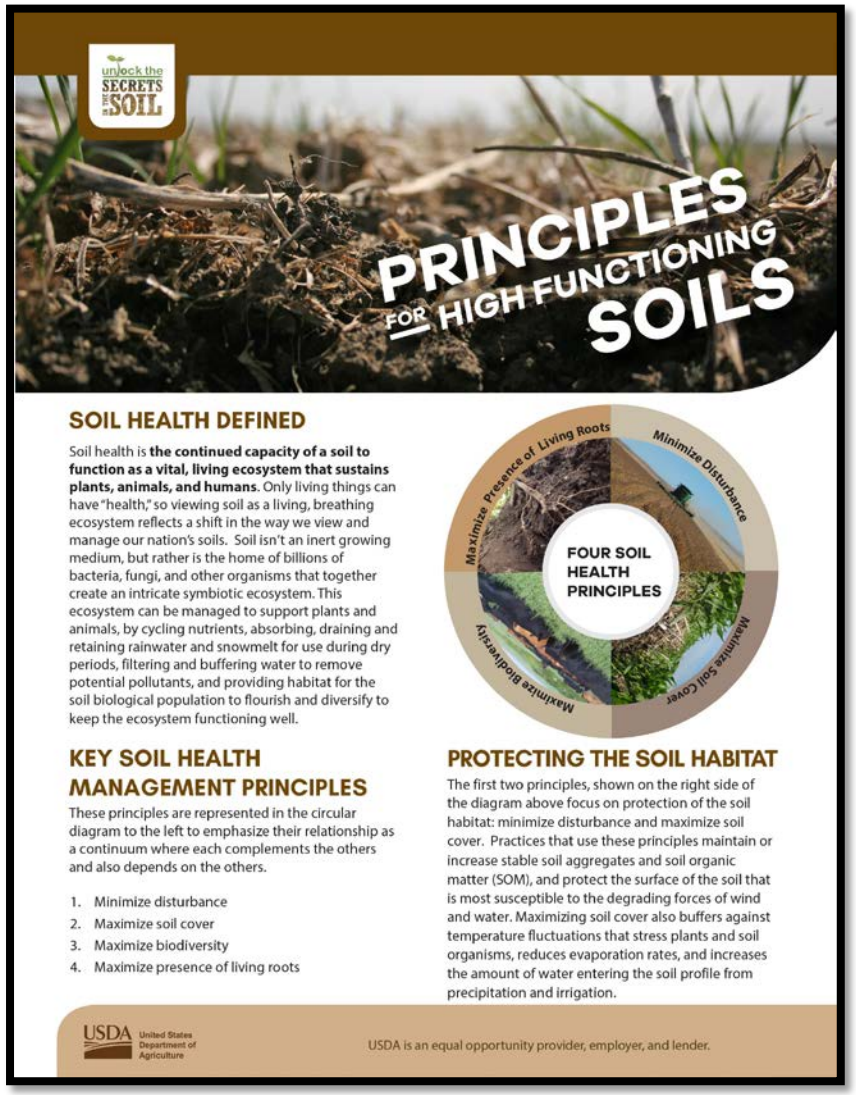
"Cover crops to me are just the next natural step in trying to have a broader system, and I think the single biggest issue we have as farmers in this country is we don't farm with a system in mind."

- panelist Howard G. Buffett, a philanthropist and Illinois farmer.

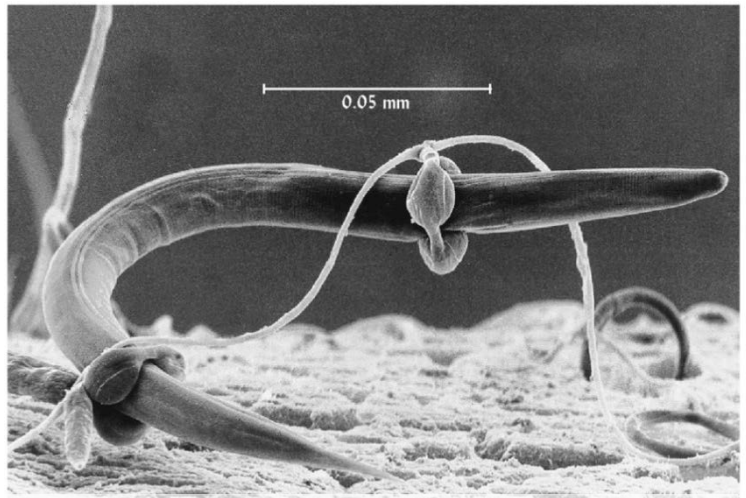
National Cover Crop Conference, 2014

NRCS Supported Integration of Organic & Conventional Approaches

USDA – Natural Resource Conservation Service (NRCS) Growing Organic video series, available at:
https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/organic/

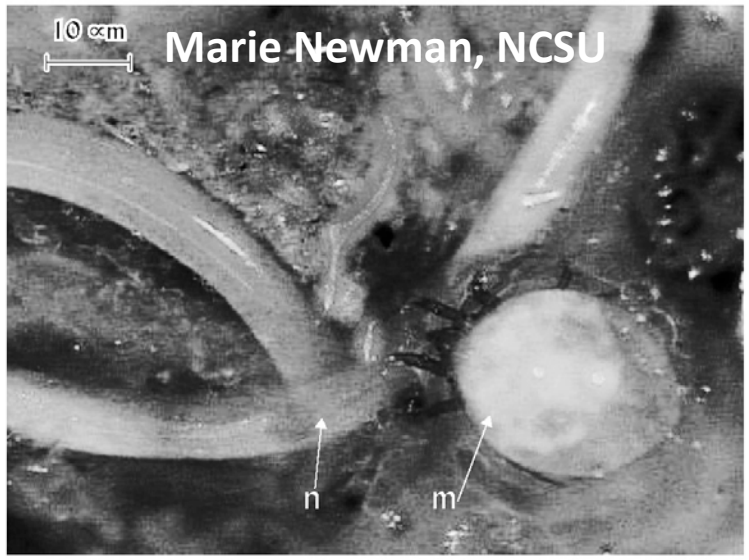


Restore Biodiversity

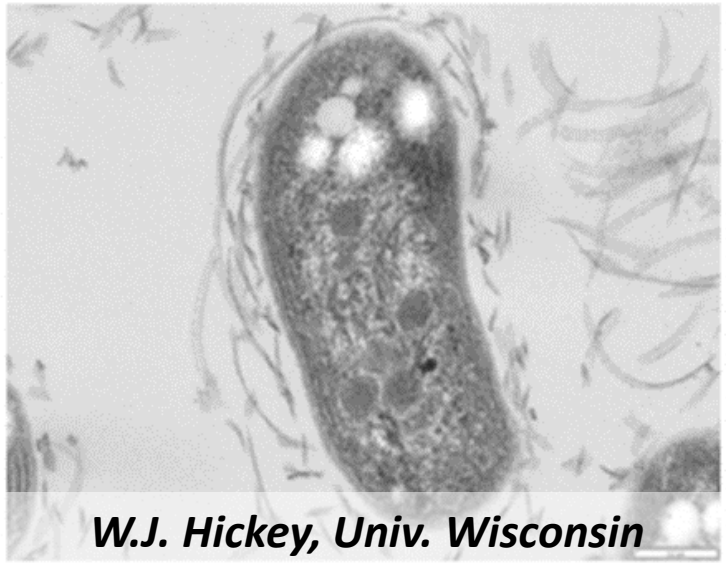


George Barron, Univ. of Guelph

Debbie Roos, NCSU



Marie Newman, NCSU



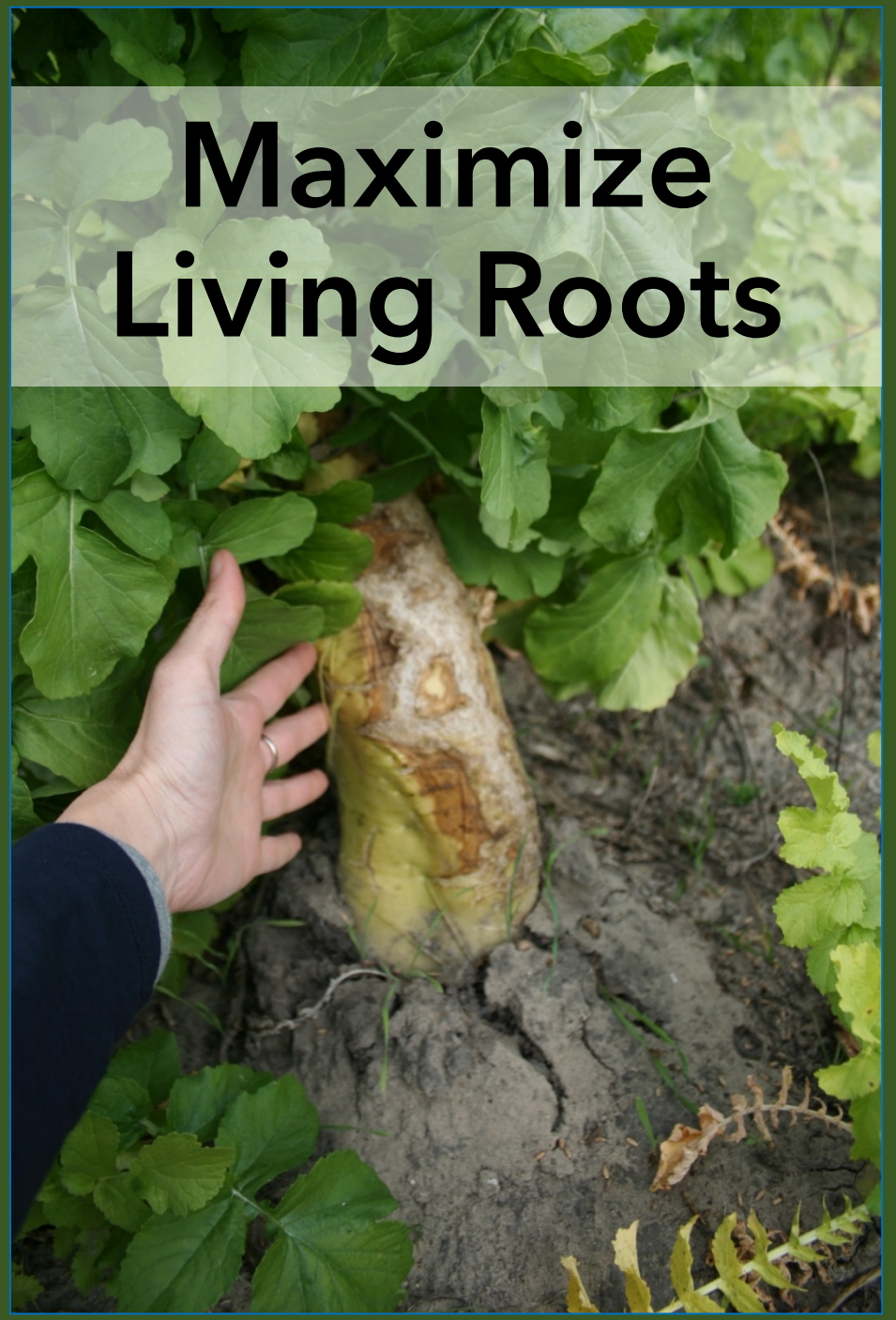
W.J. Hickey, Univ. Wisconsin

Minimize Soil Disturbance

AMF on corn root with hyphae and spores.
Green dye indicates glycoprotein production

Muruganandum, 2005

Maximize Living Roots



LIVE OAK, FL, USA, 2013

UZBEKISTAN, 2022

Retain Residue

MANY THANKS TO DAVID WRIGHT!

- Designer/brains behind the Integrated Crop-Livestock System
- A true champion of sustainable systems
- Supporter of no-till organic before it was cool
- Always there to bounce ideas off of – no matter how crazy
- Consistently positive and happy to see you!

Kathleen Delate, Professor, Iowa State University

USDA-NIFA-ORG experiment showed viable no-till vegetable yields with superior soil quality

Tomato yields:

- **25 tons/acre in organic Tilled system**
- **24 tons/acre in organic No-Tilled system**

Mulched onions

No-till tomatoes

Tilled tomatoes

Rodale roller/crimper

Delate, K., D. Cwach, and C. Chase. 2012. Organic no–till system effects on soybean, corn and irrigated tomato production and economic performance in Iowa, USA. Renewable Agriculture and Food Systems 27(1):49–59. doi: 10.1017/S1742170511000524.

Integrating livestock with crops: our OREI grant findings

- ✓ Enhances nutrient cycling
- ✓ Preserves soil carbon with year-round plant cover
- ✓ Grazed wheat and rye pastures having a greater amount of the soil enzyme, glucosidase, and greater soil nitrate levels to support row crops in the rotation

—Galindo, F.S., Delate, K., Heins, B., Phillips, H., Smith, A., and Pagliari, P.H. 2020. Cropping System and Rotational Grazing Effects on Soil Fertility and Enzymatic Activity in an Integrated Organic Crop-Livestock System. Agronomy 10: 803: https://www.mdpi.com/2073-4395/10/6/803

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Cover Crop Innovators Series

SARE Outreach - 14 / 24

Stephen Fulford - Monticello, Florida
SARE Outreach

15 

Noah Shitama - Alachua, Florida
SARE Outreach

16 

Kirk Brock - Monticello, Florida
SARE Outreach

17 

Jordan Brown - Gainesville, Florida
SARE Outreach

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John Bitter - Hawthorne, Florida
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Cody Galligan - Gainesville, Florida
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Stephen Fulford - Monticello, Florida

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Jim Hershey - Elizabethtown, Pennsylvania
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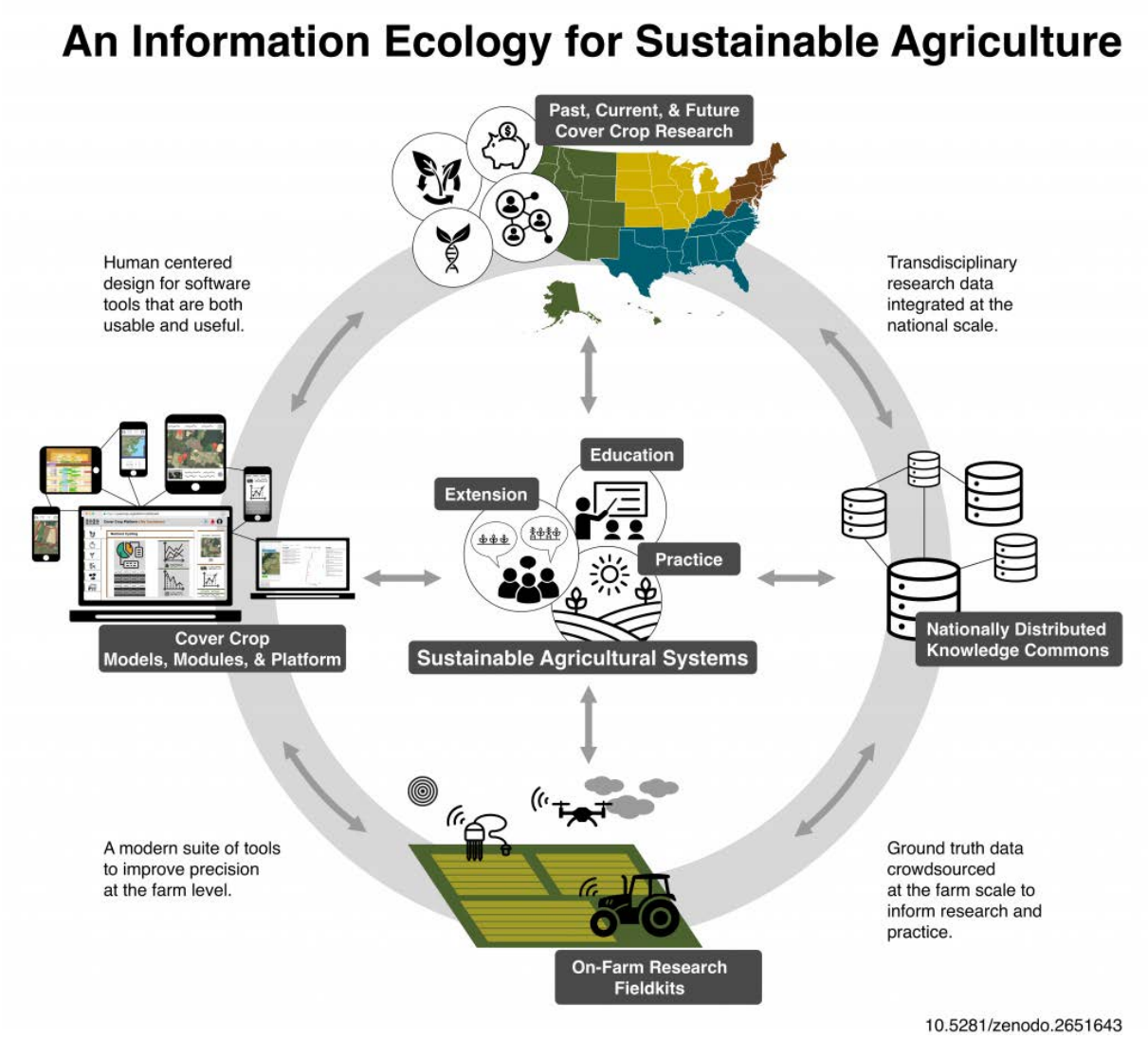
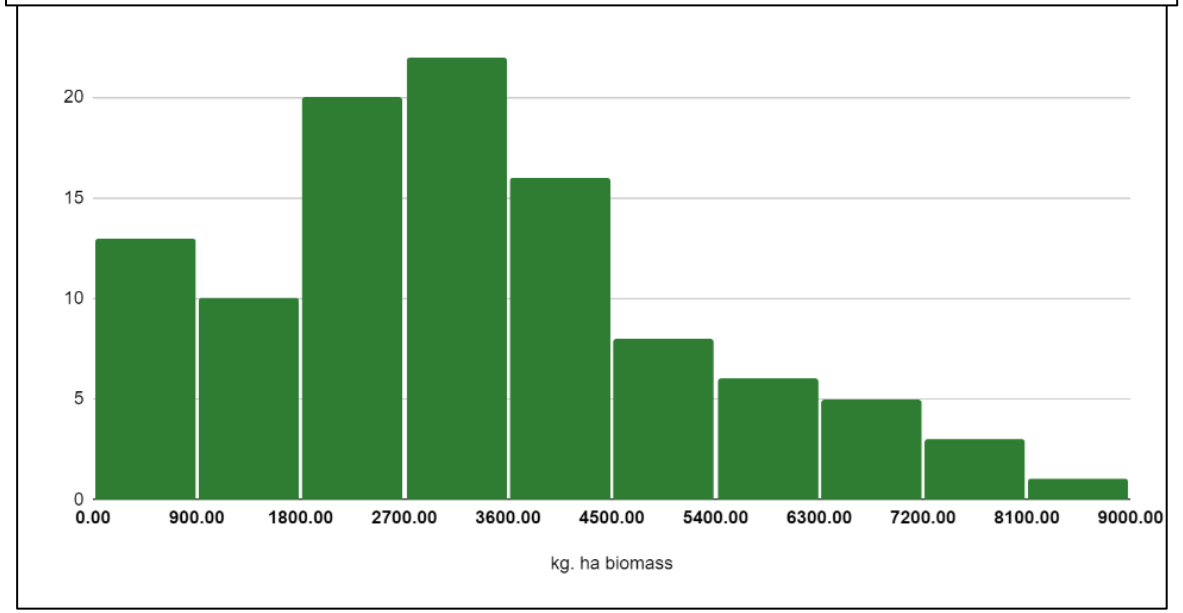
Under Cover Farmers - Feature Length

Networks of Networks to Increase Adoption and Improve Cover Crop Management



PSA preliminary data illustrating the distribution of cover crop biomass (dry weight) – 52/100+ sites in 2021. Mean biomass was 3,300 kg/ha or 3,696 lb/a.



PSA: https://precisionsustainableag.org/about-us/