USDA United States Department of Agriculture Office of the Chief Scientist

Visioning of United States, (U.S.) Agricultural Systems for Sustainable Production Stakeholder Listening Session Meeting

Thursday, March 2, 2017 8:30am – 4:30pm USDA South Building Cafeteria

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20min Break and Networking

reminder: stop and restart WebEx Recording to reduce file size

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Sara Scherr, Ph.D.

President, EcoAgriculture Partners
Chair, Landscapes for People, Food and Nature Initiative

Seth Murray, Ph.D. (USDA-OCS) moderating

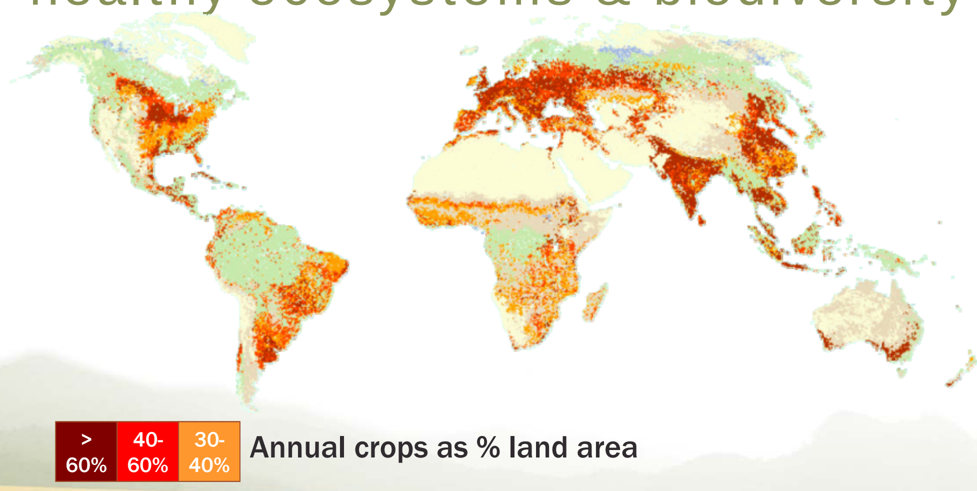
Agricultural Production Landscapes:

Long-term research priorities in the U.S. to sustain productivity, ecosystem health and prosperous communities

Sara J. Scherr, President, EcoAgriculture Partners
Washington, D.C.
February 3, 2017

ecoagriculturepartners
www.ecoagriculture.org
www.peoplefoodandnature.org

Agricultural lands—central to healthy ecosystems & biodiversity



www.ecoagriculture.org

Healthy ecosystems—central to ag'l productivity, profits, resilience

www.ecoagriculture.org

Long-term goal: Re-shape the relation of farming & ecosystems

- From a leading threat to biodiversity, to a key pillar of our biodiversity conservation strategy
- From a leading consumer and polluter of water, to a key contributor to healthy watersheds and reliable clean water supplies
- From a leading consumer of fossil fuels, to a producer of renewable energy
- From a leading source of greenhouse gases, to one of the most important carbon sinks
- From a marginal role, to a key solution for nutrition, employment, social inclusion, and rural renaissance

www.ecoagriculture.org

Integrated landscape management

Agri-landscape partnerships

2013-15	Africa	Latin America & Caribbean	S & SE Asia	Europe
Landscape partnerships surveyed	87	104	174	71
Principal motivations	Reduce degradation, sustainable land management, conserve biodiversity, improve food security, increase productivity, improve water security, sustain cultural values			
Average # objectives	8	7	6	8
Average # stake-holder groups	9	11	11	6
Most common participants	Local govts, farmer associations, local NGOS, nat'l-int'l NGOs, agribusiness, national govts, regional agencies			

Australia – Landcare, China – incipient, USA - ???

Clark Fork River Coalition, Montana

Science-based, community-focused, stakeholder-informed, and fueled and sustained by diverse partnerships

www.ecoagriculture.org

Scientific research priorities

1) Collaborative research/info framework across sectors and scales
2) Agri-socio-ecological dynamics in agricultural landscapes
3) Landscape-scale ecosystem management to increase productivity and resilience
4) Technologies and tools to increase synergies and reduce tradeoffs among landscape values
5) Long-term, public-private-local research to support multi-stakeholder partnerships

* Adapted from Solutions from the Land. 2013. *Developing a New Vision for United States Agriculture, Forestry, and Conservation*. http://sfldialogue.net; Landscapes for People, Food and Nature Initiative Global Review findings, www.peoplefoodandnature.org

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Diana Jerkins

Research Director
Organic Farming Research Foundation

Oral / no slides

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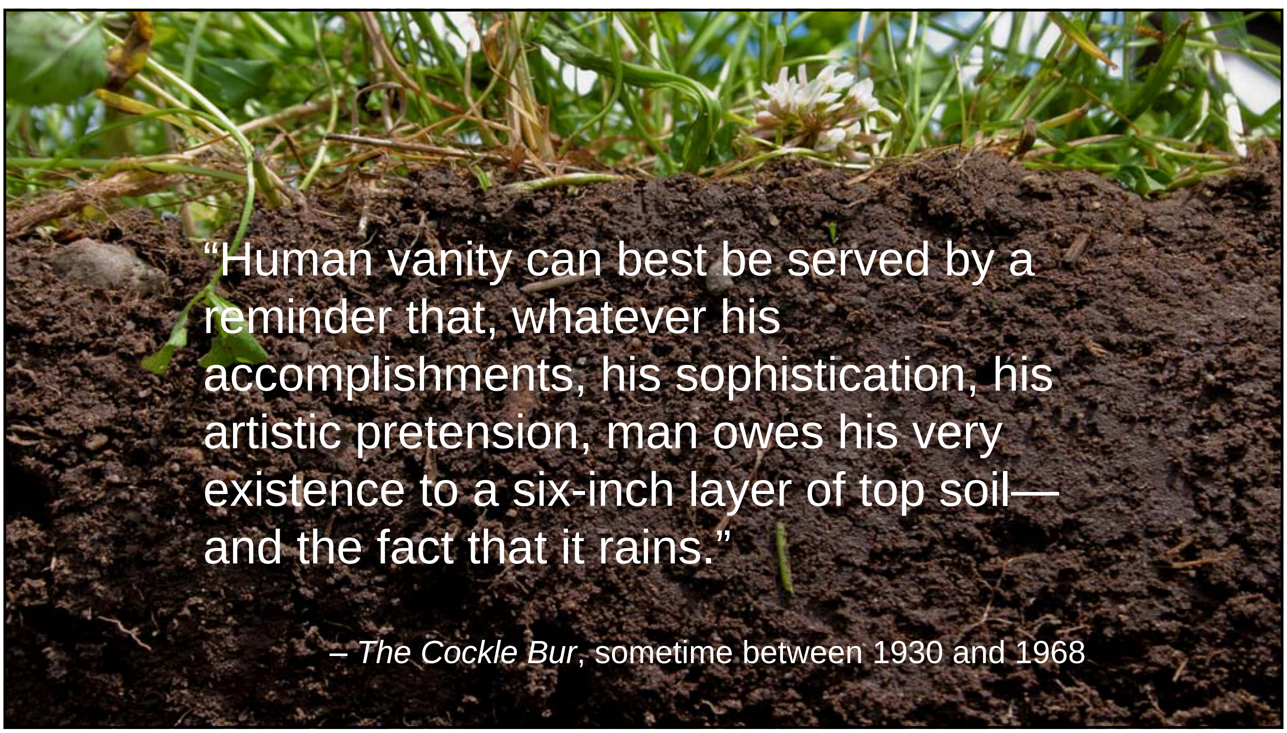
Alexis Baden-Mayer, Esq.

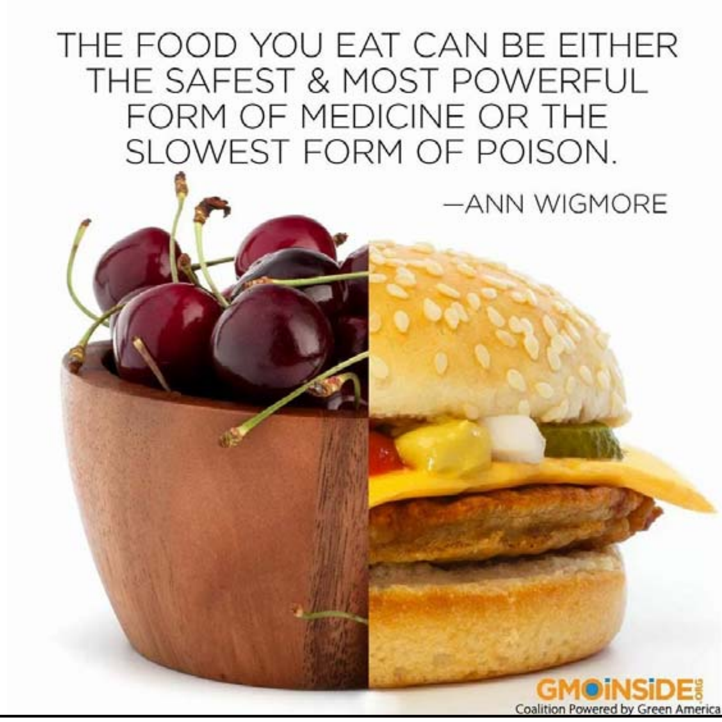
Political Director
Organic Consumers Association

ALEXIS BADEN-MAYER

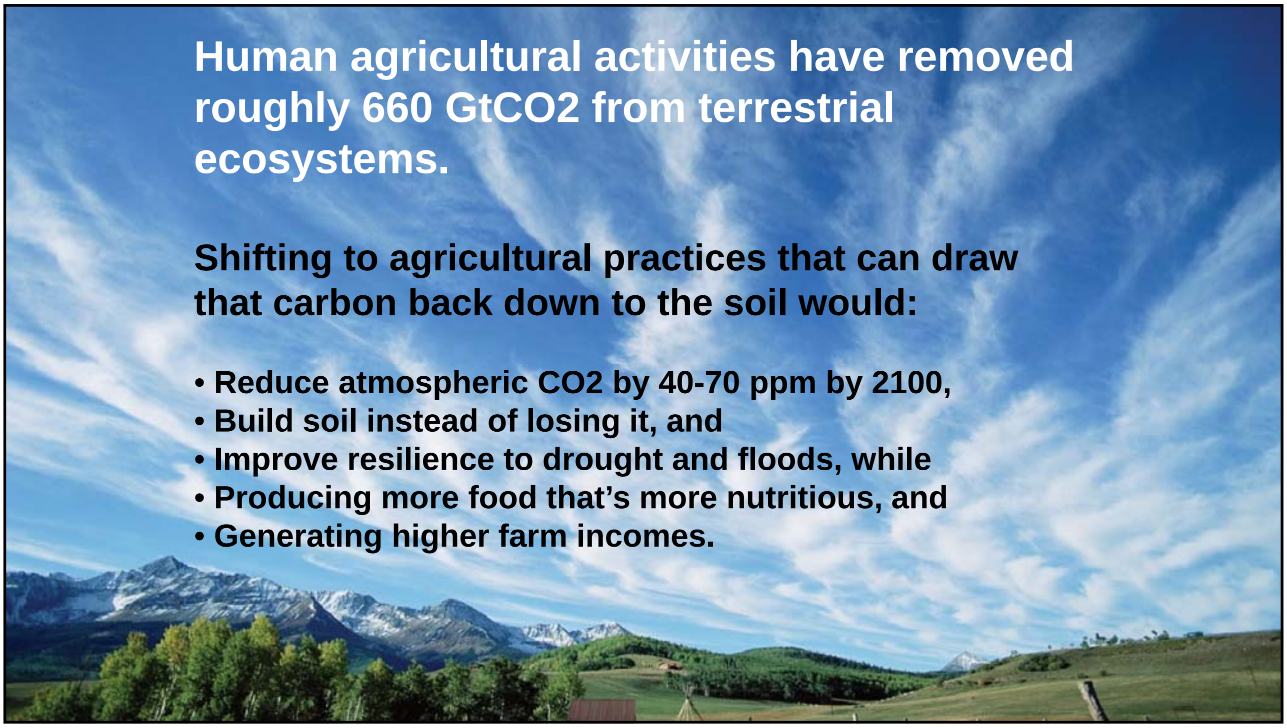
Political Director

RegenerationInternational.org





"Climate change isn't just an issue. It is the entire context in which we have to make all our public policy decisions."
–Congressman Jamie Raskin



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Kathleen Delate, Ph.D.

Professor-Organic Agriculture
Depts. of Agronomy and Horticulture
Iowa State University

Oral / no slides

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Ann Bybee-Finley

Doctoral student in Agronomy
Soil and Crop Science Section
School of Integrated Plant Sciences
Cornell University

Cornell University

Sustainable Cropping Systems Lab
https://scslabcu.wordpress.com/

Ann Bybee-Finley
kab436@cornell.edu

Building Resilient Cropping Systems

Focus: Dairy producers in the Northeast

Restorative Capacity
(Crop Insurance)

Resilience
Capacity

Absorptive Capacity
(Intercropping)

Adaptive Capacity
(Double Cropping)

Matthew Ryan, Richard Smith, Heather Darby

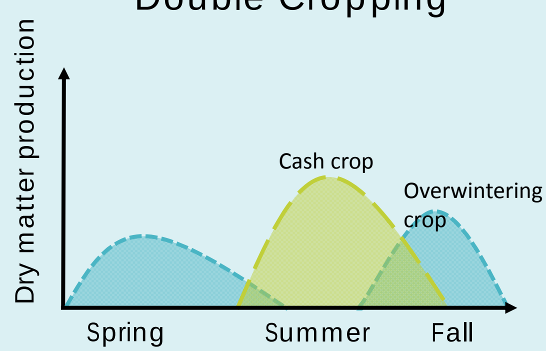
Ecological Insurance

Uses practices that draw on ecology to reduce risk

Intercropping

Intercrops had greater stability in yields across environments.
Bybee-Finley, A., et al. Crop Science (2016)

Double Cropping



83 % surveyed NY farmers (n = 30) planned to continue to double crop.
Ketterings, Q., et al. J Agricultural Science (2015)

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Bruce Goldstein

President
Farmworker Justice

Oral / no slides

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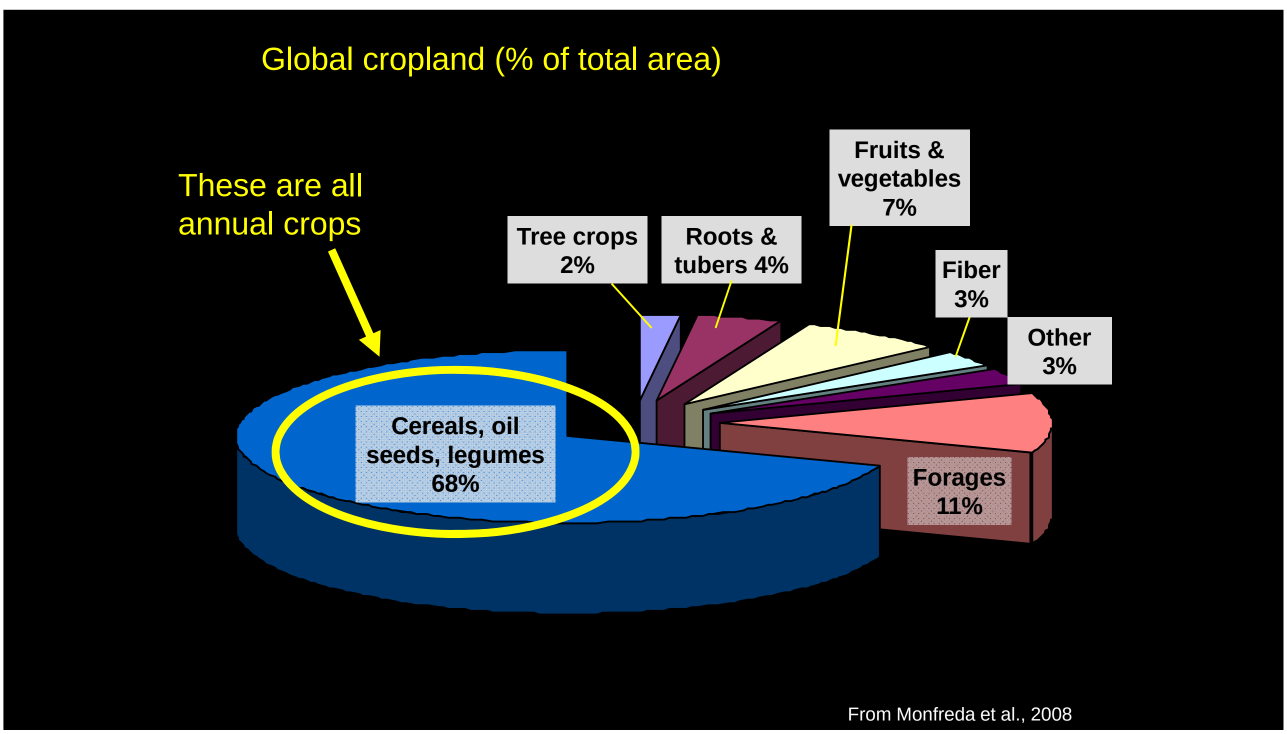
Jerry Glover, Ph.D.

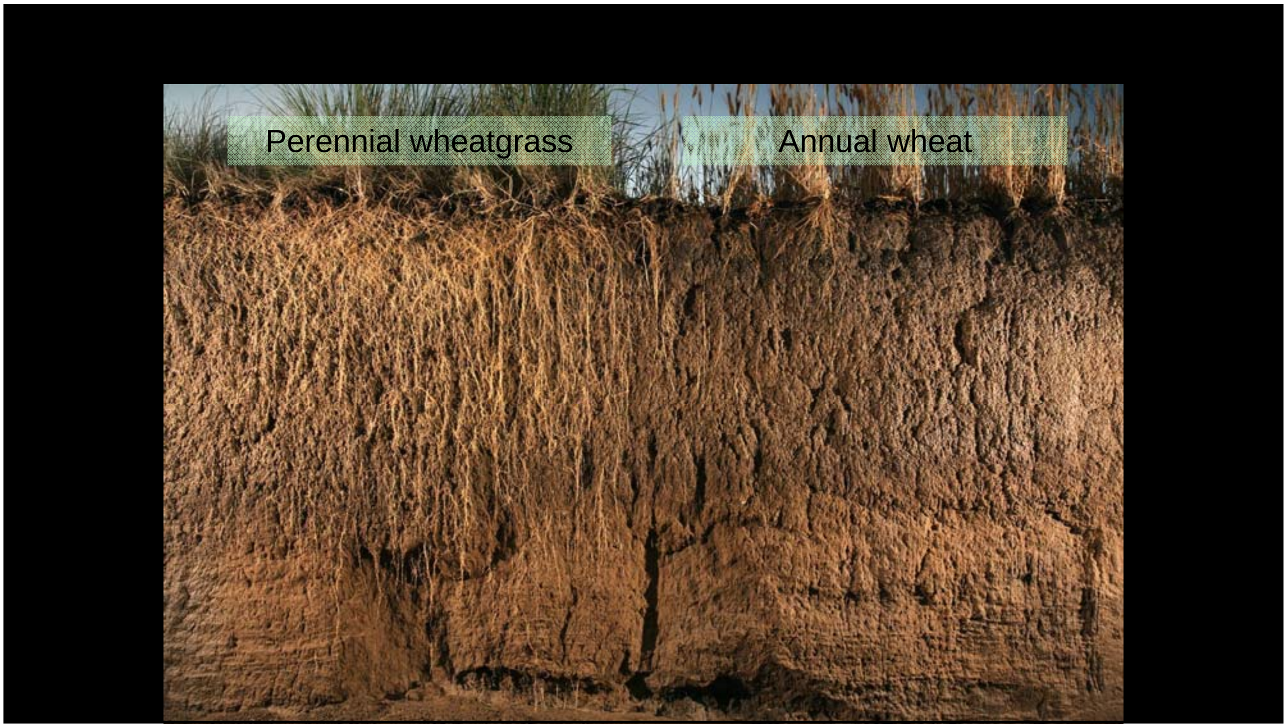
National Geographic Explorer

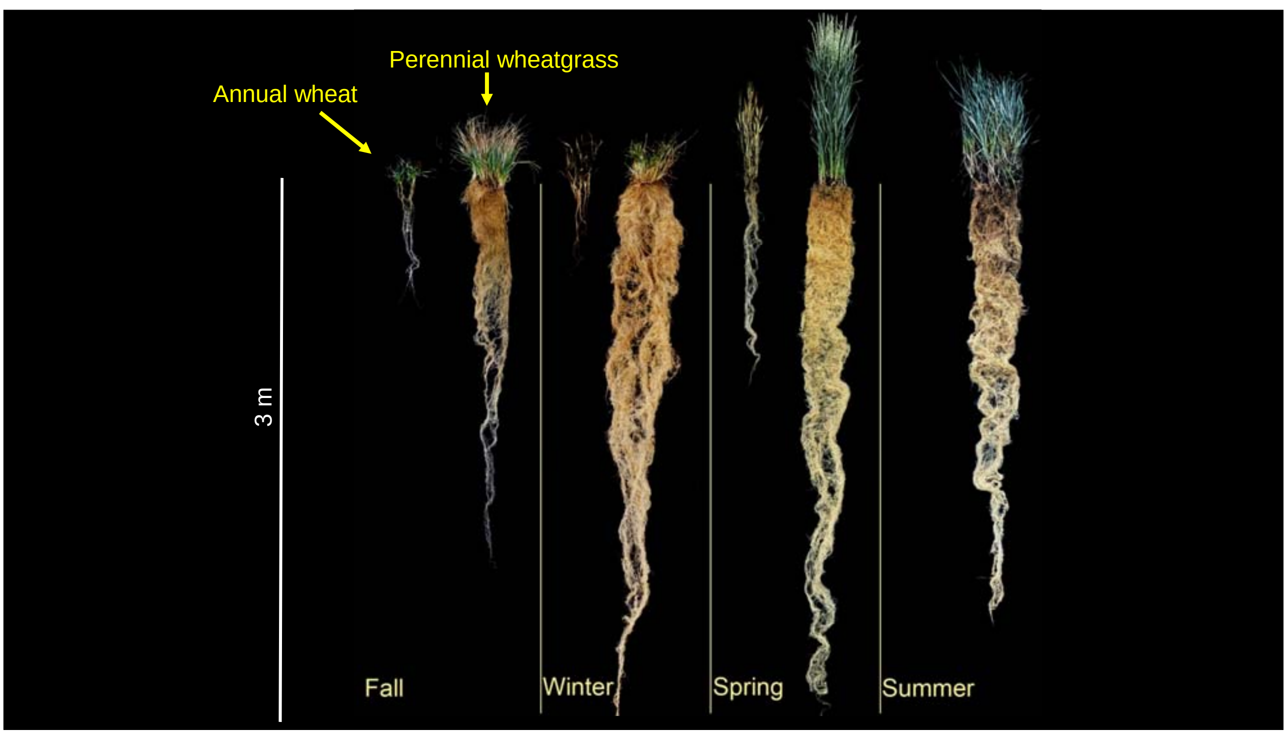
National Science and Technology Council's Subcommittee on Food and Agriculture Subcommittee on Ecosystem Services

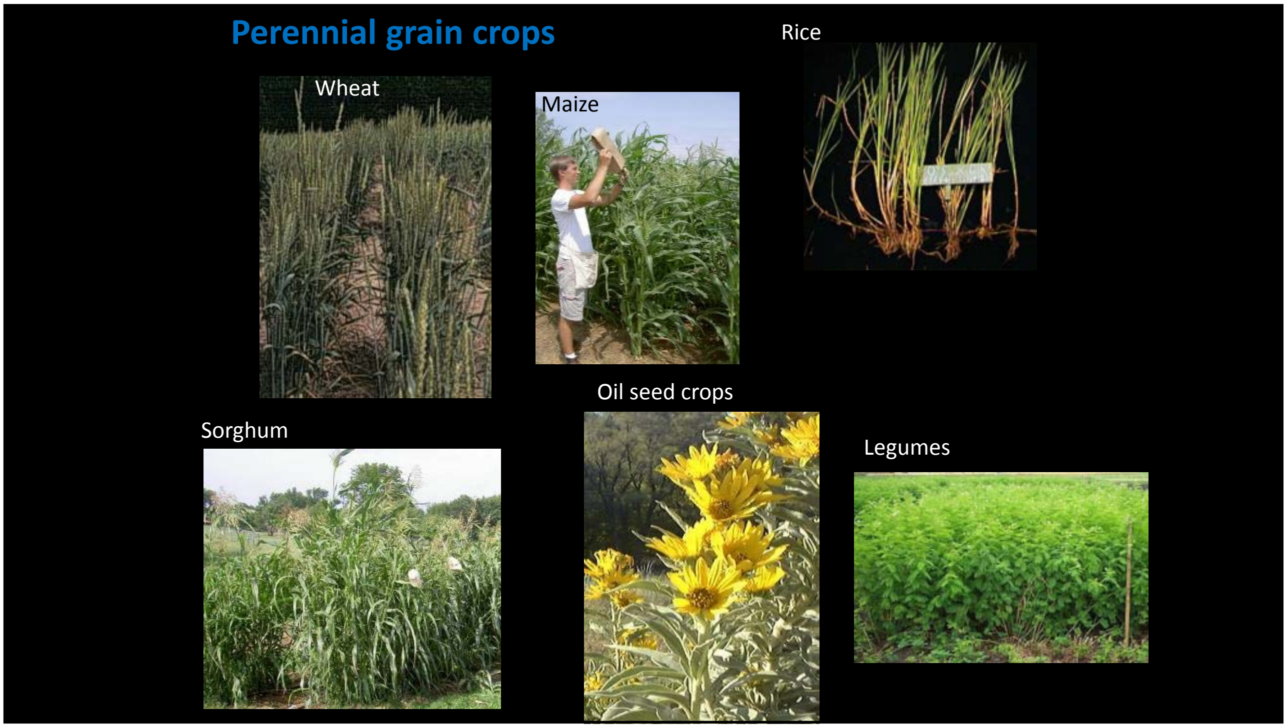
Senior Sustainable Agricultural Systems Advisor
USAID

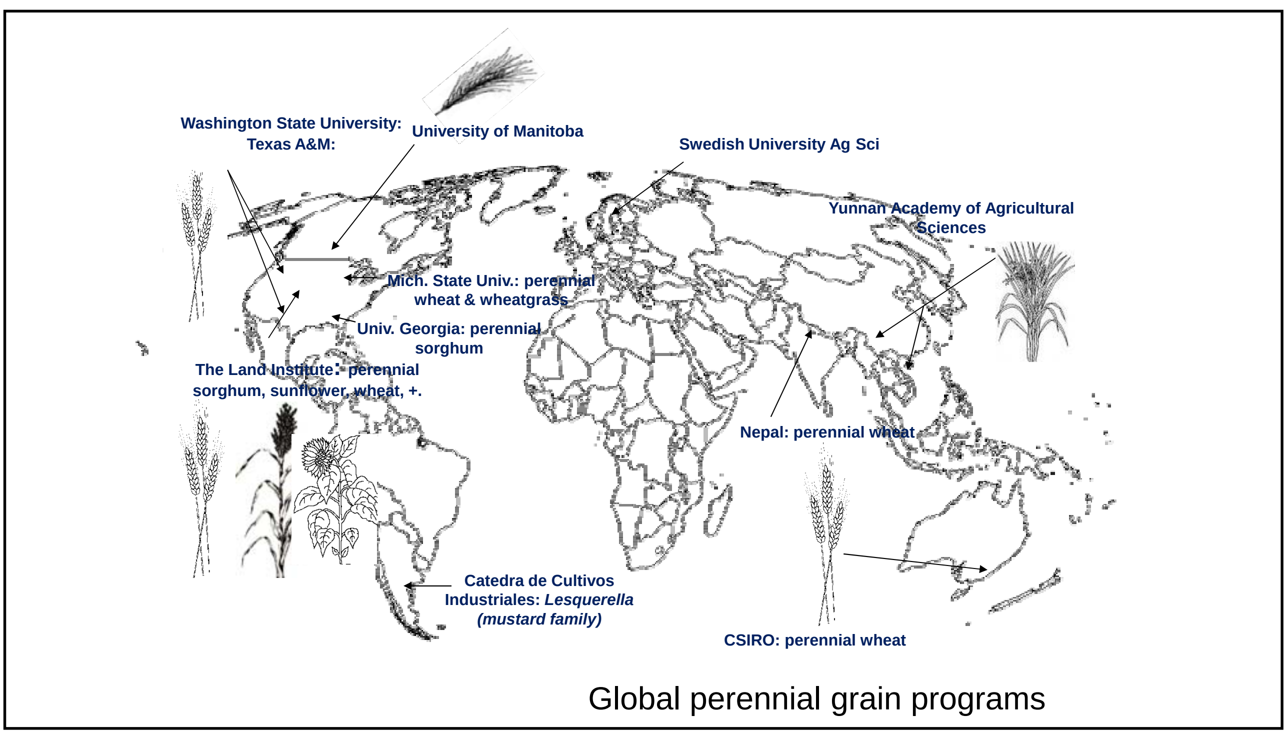

travellingmoods.com


Global cropland (% of total area)
These are all annual crops
Cereals, oil seeds, legumes 68%
Tree crops 2%
Roots & tubers 4%
Fruits & vegetables 7%
Fiber 3%
Other 3%
Forages 11%
From Monfreda et al., 2008


Perennial wheatgrass
Annual wheat


Perennial wheatgrass
Annual wheat
3 m
Fall
Winter
Spring
Summer


Perennial grain crops
Wheat
Maize
Rice
Sorghum
Oil seed crops
Legumes


Washington State University:
Texas A&M:
University of Manitoba
Swedish University Ag Sci
Yunnan Academy of Agricultural Sciences
Mich. State Univ.: perennial wheat & wheatgrass
Univ. Georgia: perennial sorghum
The Land Institute: perennial sorghum, sunflower, wheat, +.
Nepal: perennial wheat
Catedra de Cultivos Industriales: Lesquerella (mustard family)
CSIRO: perennial wheat
Global perennial grain programs

Perennial wheat: Long-term crop breeding

Kernza: Med-term opportunities but needs reliable sourcing

__The comments and opinions expressed herein are those of individual stakeholders made publicly and do not necessarily represent those of USDA__

Pigeon pea: Immediate use but needs improved traits

Perennial grain <u>benefits</u>

1. Human well-being: Diversifies humanity's key energy sources (grains, legumes, oil seeds)
2. Environment: better protects soil and water, 'feeds' the soil, and provides greater support to ecosystem services
3. Improved resource utilization: Increased nutrient use efficiency; greater reliance on and support for on-farm natural biological cycles; more photosynthesis
4. Climate change: Additional tools for farmers to respond to increased rainfall intensity and prolonged drought

Perennial grain opportunities

1. Advances in genomics, phenotyping, and bioinformatics potentially reduce by half the breeding times needed
2. Perennial breeding programs add value to annual breeding programs—'parallel complementary breeding strategies' for improved nutrient use, pest resistance, drought tolerance
3. Advances in food processing lower adoption barriers & broaden commercial potential
4. Recognition that farms must perform multiple functions—produce food, support environment, manage water, support wildlife, etc

Perennial grain challenges

1. Sustained medium- to long-term support is needed for significant impact & will likely depend on public support for initial stages
2. High 'procrastination penalty'—food crises elicit short-term solutions. Investments need to happen before crises occur.
3. Questions remain about seed systems, pests and disease, input requirements—difficult to answer until developed. [These don't pose insurmountable problems].

Investing in perennial grains:

1. Low-risk, high-potential impact
   - Beyond proof-of-concept
   - Large environmental & economic impact potential
2. Transformative game-changer for agriculture (2010 Nat'l Acad. Sciences report on sustainable agriculture)
3. Addresses national and international agriculture priorities and needs

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 # 18 **Seth Murray, Ph.D. (USDA-OCS)**

Moderated Questions and Discussion Time

Sara Scherr
Diana Jerkins
Alexis Baden-Mayer, Esq.
Kathleen Delate, Ph.D.
Ann Bybee-Finley
Bruce Goldstein
Jerry Glover

reminder: if no live comments, go to WebEx chat

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Lunch and Breakout

Group number is on badges

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Choose three to address, be specific

- What are the major strengths of current agricultural systems that are important to maintain in future systems?
- What are the major weaknesses of current agricultural systems that could be improved on in future systems?
- What are the major opportunities for agricultural systems of the future? How can technology and scientific findings facilitate these?
- What are the major threats for agricultural systems of the future?
- What research will be needed and how can this be accelerated?
- What infrastructure will be needed?
- What changes will be needed for new systems to succeed?
- How can we educate the next generation to solve these challenges?