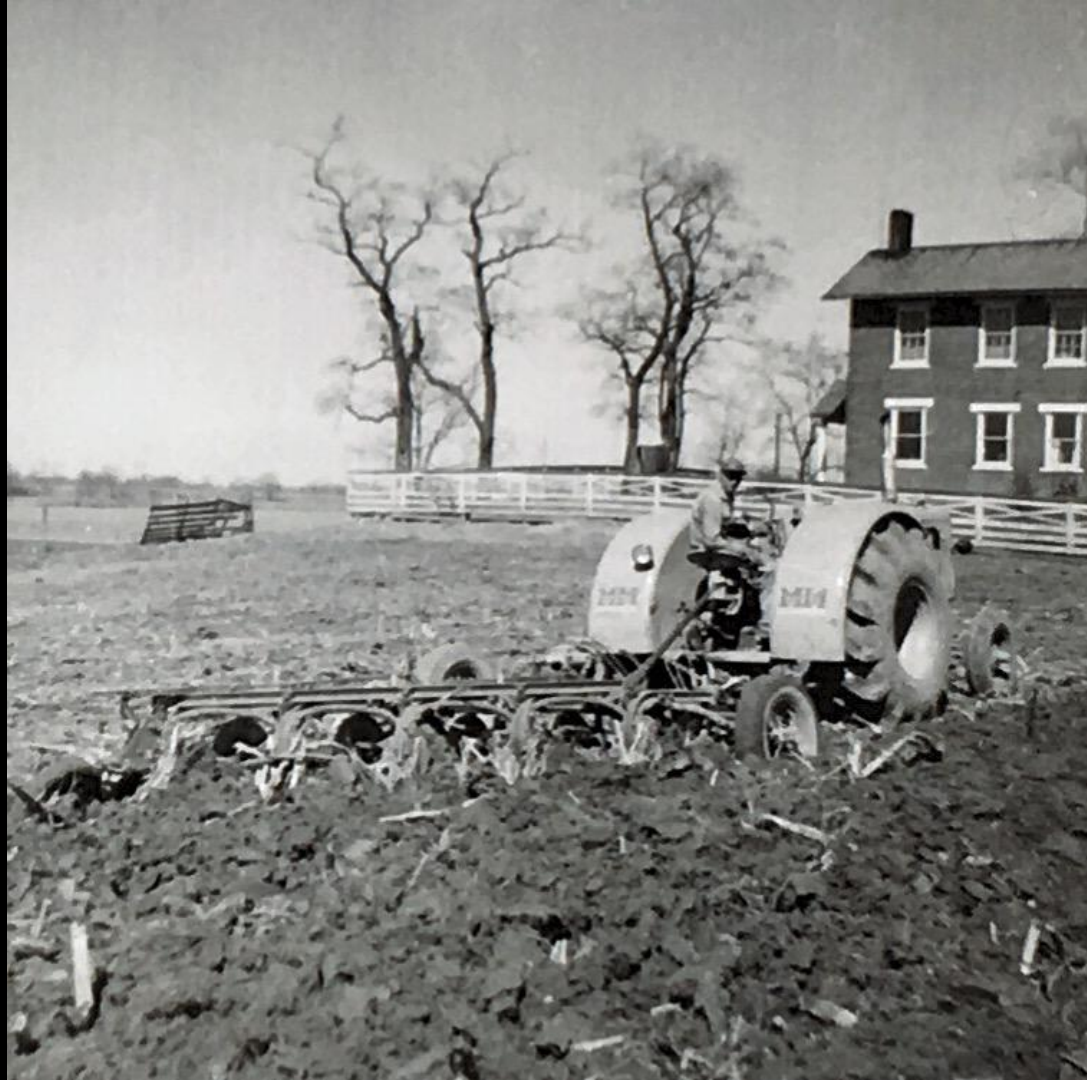


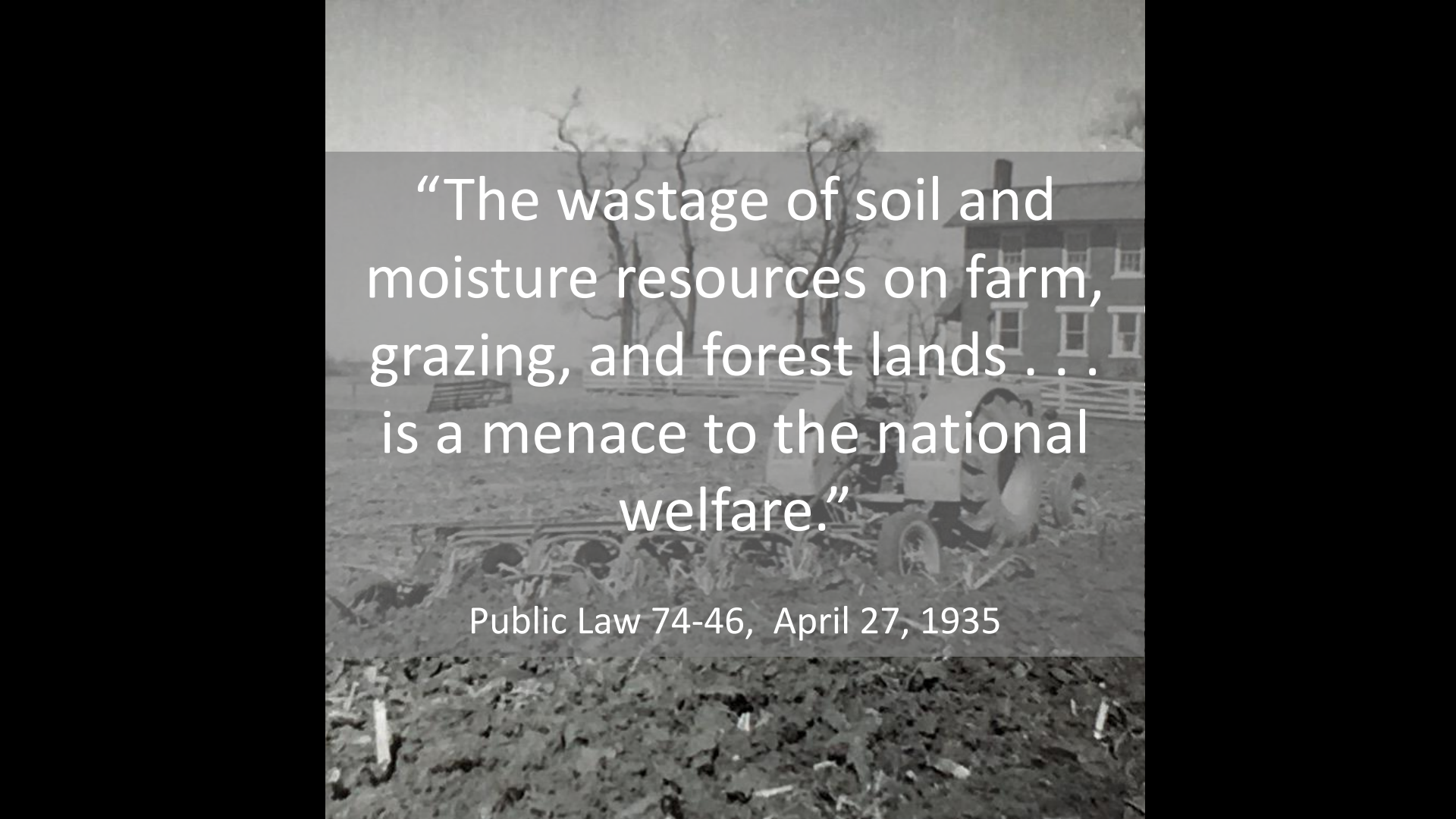


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TILLAGE IN ORGANICS & THE USDA ORGANIC REGULATIONS

Presented By Mallory Krieger



A black and white photograph of a farm scene. In the foreground, there is a tractor with a large implement, possibly a plow or harrow, in a field. In the background, there is a two-story house with a chimney and several windows. The sky is overcast, and there are bare trees. The overall scene suggests a rural, agricultural setting.

“The wastage of soil and moisture resources on farm, grazing, and forest lands . . . is a menace to the national welfare.”

Public Law 74-46, April 27, 1935



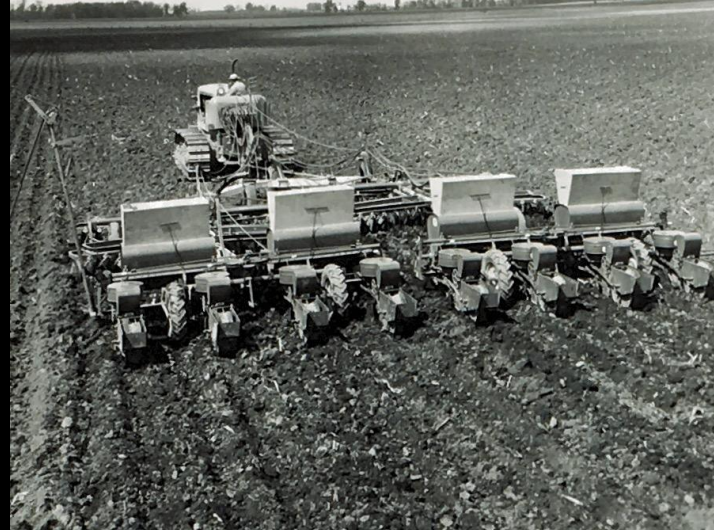




Potential **Costs** of Tillage

Erosion Crusting Compaction Reduced organic matter Damage to soil structure







Long-Term Agroecological Research Experiment (LTAR)

Iowa State University

“The organic plots had up to 40% more biologically-active soil organic matter, which is important for fertility and nutrient availability. Organic soils also had lower acidity and higher amounts of carbon, nitrogen, potassium, phosphorus, and calcium.”

(Long Term Study Shows Soil-Building Benefits of Organic Practices, www.certifiedcropadviser.org)





Soil organic carbon is affected by organic amendments, conservation tillage, and cover cropping in organic farming systems: A meta-analysis

Robert Crystal-Ornelas  , Resham Thapa , Katherine L. Tully 

Abstract

Meta-analysis is often used to compare how soil health differs between organic and conventional farming systems. However, the burgeoning primary literature on organic farming now allows direct evaluation of the best management practices (BMPs) within organic farming systems on soil health improvements. Therefore, the main objective of this meta-analysis was to investigate the effect of BMPs, such as organic amendments, conservation tillage, and cover cropping, on soil health within organic farming systems. We focused on two principal soil health metrics: soil organic carbon (SOC) and microbial biomass carbon (MBC) concentrations. On average, adoption of BMPs increased depth-weighted SOC and MBC concentrations by 18 and 30 %, respectively, relative to organically-managed control groups. Among BMPs, organic amendments and conservation tillage practices showed net positive effect on soil health with 24 and 14 % increase in depth-weighted SOC concentrations, respectively. Although cover cropping did not have an overall influence on SOC concentrations, we found a temporal trend such that cover cropping significantly increased SOC concentrations after 5 years of its adoption. This indicates that the soil health benefits from BMPs accrue over time and highlights the need of long-term adoptability of BMPs to achieve agricultural sustainability. Future primary articles that focus on under-

How do we get the benefits of tillage and mitigate the costs?

The key is to **protect soil health** in the face of tillage.



Soil Fertility and Crop Nutrient Management Practice Standard

USDA Organic Regulation § 205.203(a)

(a) The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of soil and minimize soil erosion.

Soil Health Principles



Soil Armor



Limit Disturbance



Plant Diversity

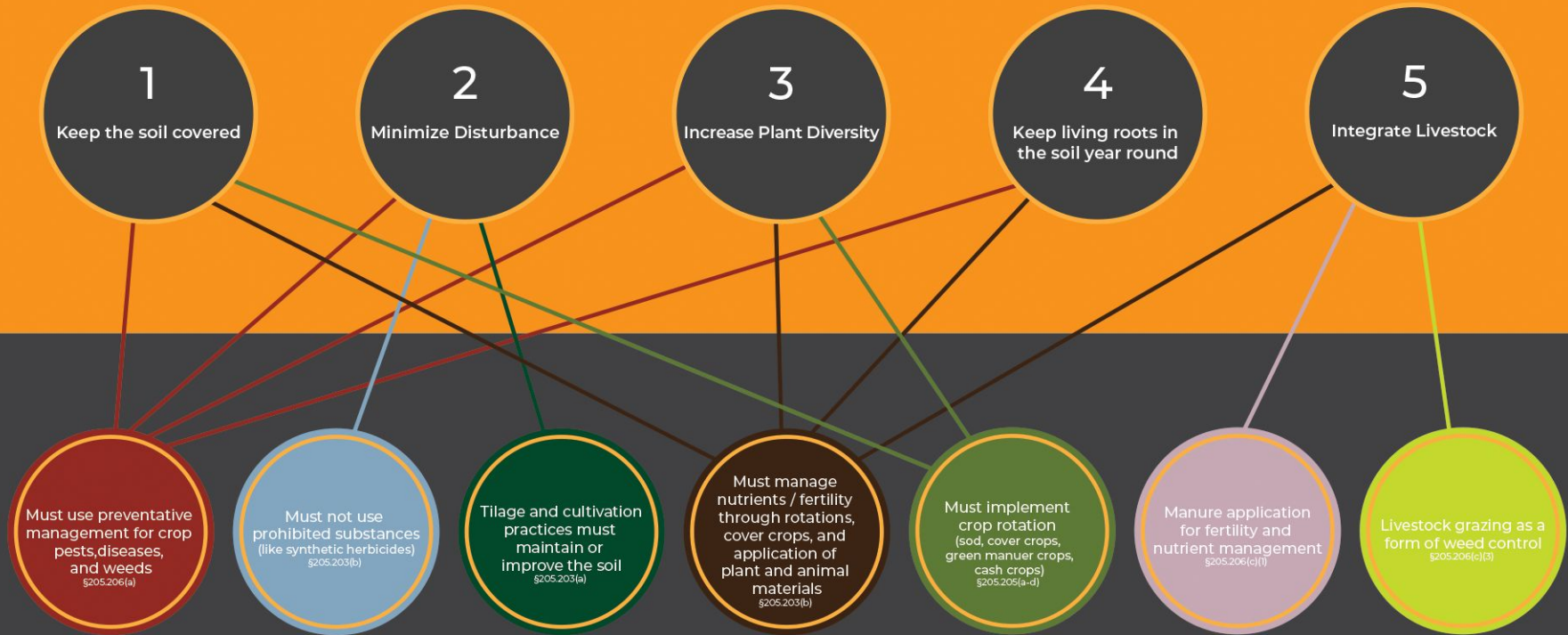


Living Roots



Livestock Integration

Principles of Soil Health



National Organic Program Regulations

The definition of organic production requires practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.

§205.2

Principles of Soil Health



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§205.2

Principles of Soil Health

1

Keep the soil covered

2

Minimize Disturbance

3

Increase Plant Diversity

4

Keep living roots in the soil year round

5

Integrate Livestock

Must use preventative management for crop pests, diseases, and weeds
§205.206(a)

Must not use prohibited substances (like synthetic herbicides)
§205.203(b)

Tillage and cultivation practices must maintain or improve the soil
§205.203(a)

Must manage nutrients / fertility through rotations, cover crops, and application of plant and animal materials
§205.203(b)

Must implement crop rotation (sod, cover crops, green manure crops, cash crops)
§205.205(a-d)

Manure application for fertility and nutrient management
§205.205(a)

Livestock grazing as a form of weed control
§205.205(d)

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§205.204-3(a)

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§205.205(c)(1)

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§205.205-3(a)

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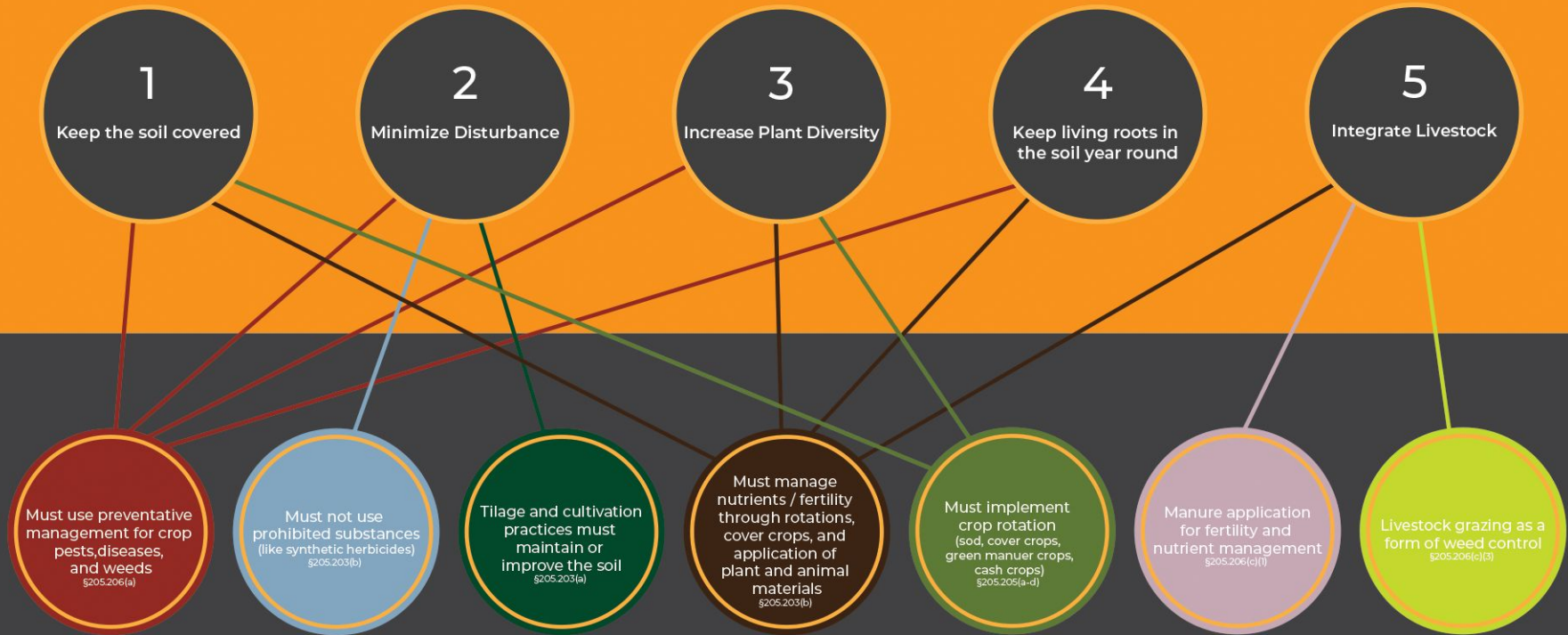
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FISTS

- Frequency
- Intensity
- Scale
- Timing
- Soil health





CROP ROTATION

The MOST important tool on organic farms

A well designed crop rotation...

- Provides living roots year round
 - Provides soil armor
 - Increases plant diversity
 - Long & phenologically diverse!
 - Minimizes disturbances
 - Specifically reduces tillage instances
 - Provides weed control support
-



IOWA CROP ROTATION - EXAMPLE

Y3>5

PERENNIAL FORAGE



Y2>3

CEREAL GRAINS



Y1

CORN



Y2

SOYBEANS

PLANNING A CROP ROTATION

- Separate crops from the same “family” by at least one growing season - never back to back
- Grow your fertilizer
 - Legumes (forages, pulse crops, cover crops) provide a substantial amount of Nitrogen to the soil
- Order the crop sequence to take advantage of weed control support
 - Small grains ahead of soybeans
 - Alfalfa ahead of corn
- Plan to space out tillage instances



Fiscal Sponsor: Organic Trade Association

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Thank you.

Mallory Krieger, mallory@organicagronomy.org

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