

Proceedings of the 11th Nutrient Management Conference



11th Annual

NUTRIENT MANAGEMENT CONFERENCE

Tuesday, February 19, 2019



BEST WESTERN KELLY INN ST. CLOUD

11th Annual

NUTRIENT MANAGEMENT CONFERENCE

Sessions 9:05 a.m.-3:40 p.m.

■ GENERAL SESSION

| | | |
|------------|---|---|
| 8:15 a.m. | <i>Registration</i> | |
| 9:00 a.m. | <i>Welcome</i> Tom Rothman | University of Minnesota |
| 9:05 a.m. | <i>Lessons Learned in 2018, Opportunities for 2019</i> Brad Carlson Dave Nicolai Gary Prescher | |
| 9:55 a.m. | <i>Phosphorus Management Challenges Confronting the US</i> Dr. Heidi Peterson | University of Minnesota Extension University of Minnesota Extension Minnesota Corn Research & Promotion Council |
| 10:50 a.m. | <i>Break</i> | |
| 11:05 a.m. | <i>Get the Most Out of Sulfur Application by Applying at Right Time</i> Dr. Dan Kaiser | University of Minnesota |
| 12:00 | <i>Lunch</i> | |

■ BREAKOUT SESSION #1

| | | |
|-----------|---|--|
| 1:00 p.m. | <i>Residue Management and Potential Effects on P Availability in a Continuous Corn System</i> Dr. Paulo Pagliari | |
| 1:55 p.m. | <i>Phosphorus Management and Water Quality</i> Dr. Lindsay Pease | |
| 2:50 p.m. | <i>Lessons Learned from Spring Creek Farms</i> Tim Radatz | |

■ BREAKOUT SESSION #2

| | | |
|-----------|---|--|
| 1:00 p.m. | <i>Evaluation of the Haney Soil Health Test as a Corn Nitrogen Management Tool</i> Dr. Matt Yost | |
| 1:55 p.m. | <i>Irrigation and Nitrogen Management</i> Dr. Vasudha Sharma | |
| 2:50 p.m. | <i>Managing Micronutrients for Soybeans</i> Dr. Dorivar Ruiz-Diaz | |
| 3:40 p.m. | <i>Adjourn</i> | |

Thank you to all of our Supporters!



DEPARTMENT OF AGRICULTURE



Minnesota's Agricultural Fertilizer Research & Education Council




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Lessons from Battling Nutrient Losses in the Western Lake Erie Basin

Dr. Lindsay Pease

Assistant Professor and Extension Specialist in Nutrient & Water Management

Department of Soils, Water, and Climate

University of Minnesota - Northwest Research & Outreach Center



UNIVERSITY OF MINNESOTA

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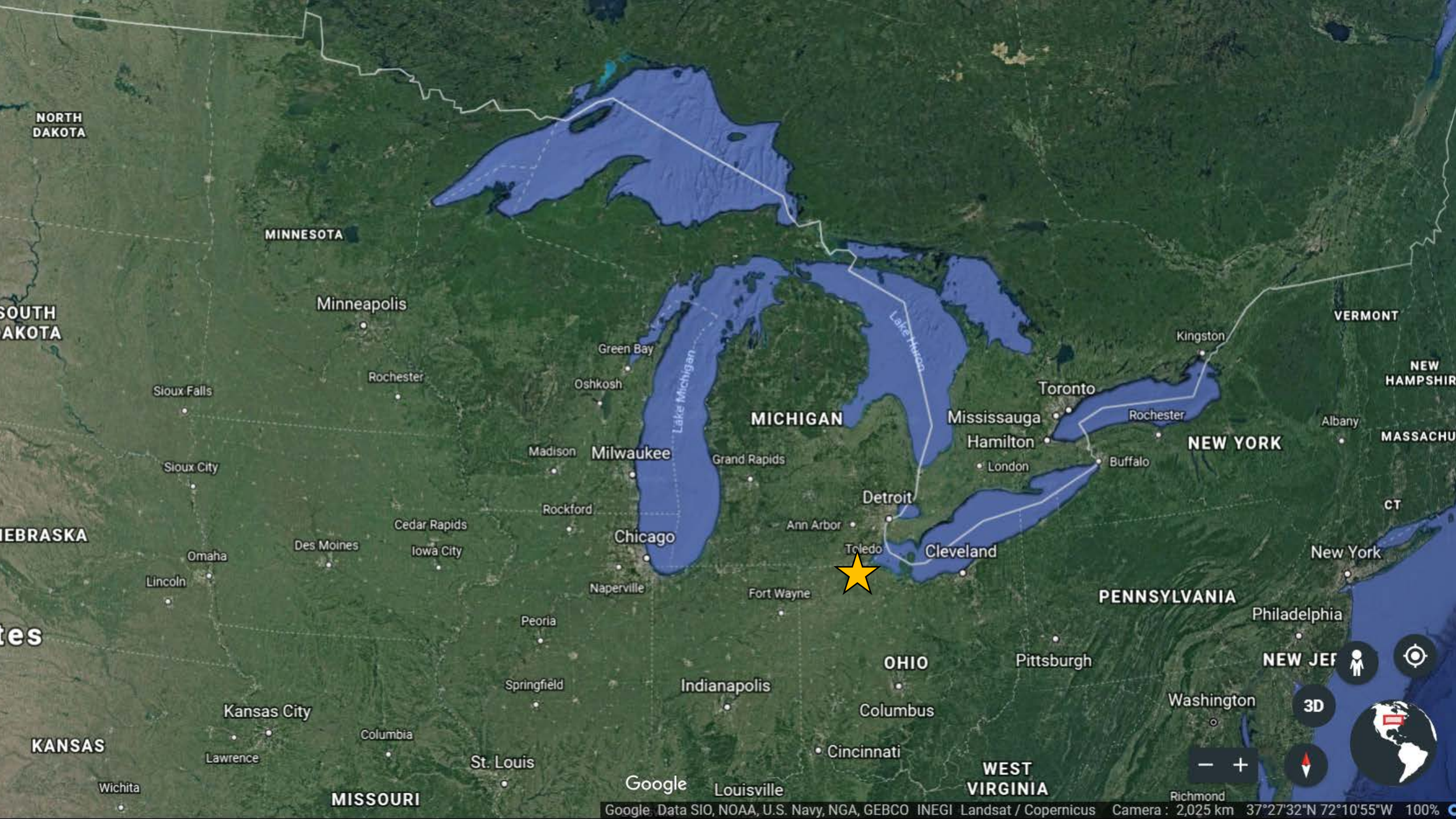
Phosphorus Management

- Don't use your soil as a bank
- Over-application of P fertilizer isn't economical

To reduce loss risk:

- Fertilize for each crop
- Band or incorporate P fertilizer





NORTH
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Sioux Falls

Sioux City

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Lawrence

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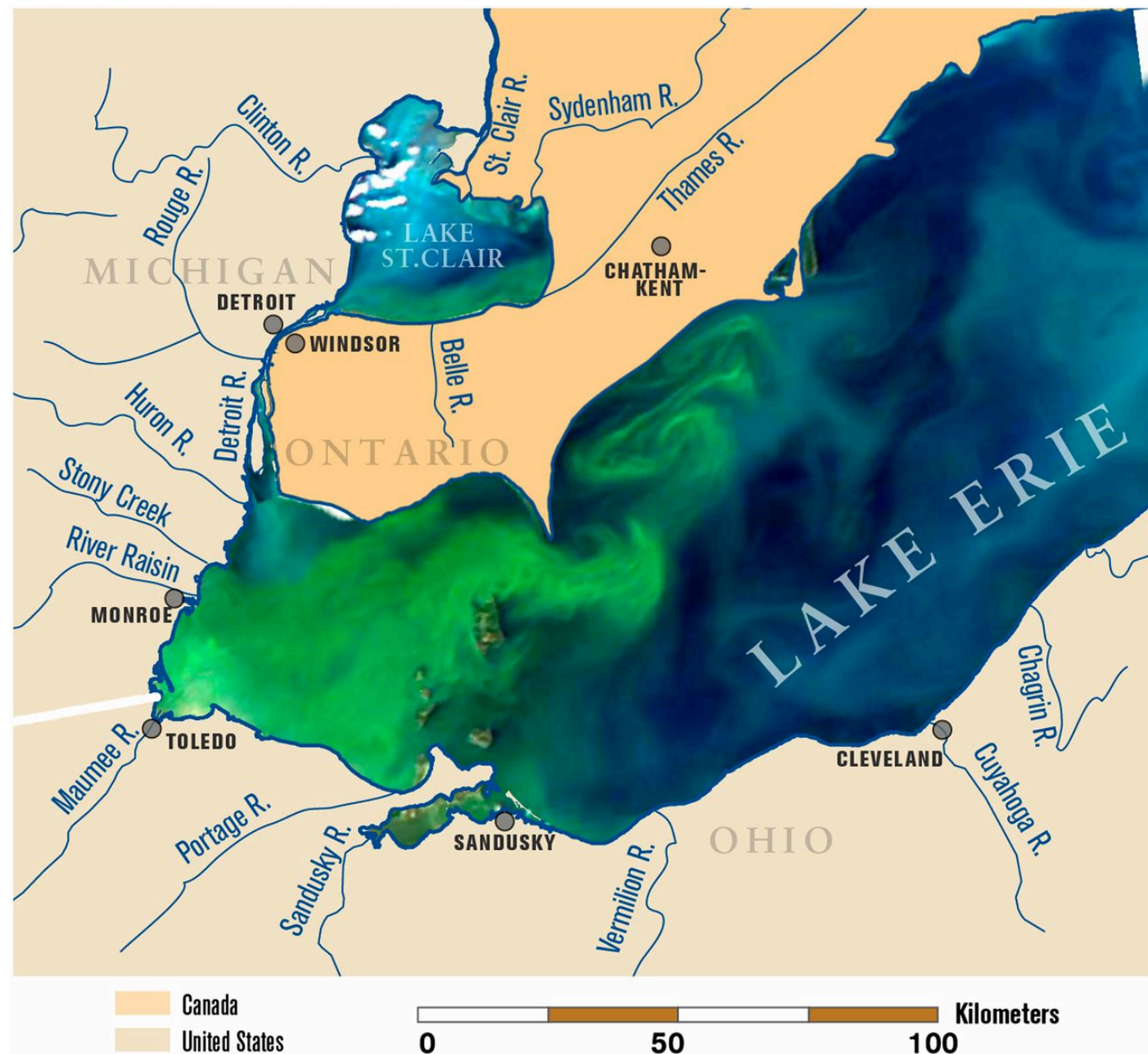
NEW
HAMPSHIRE

MASSACHUSETTS

CT









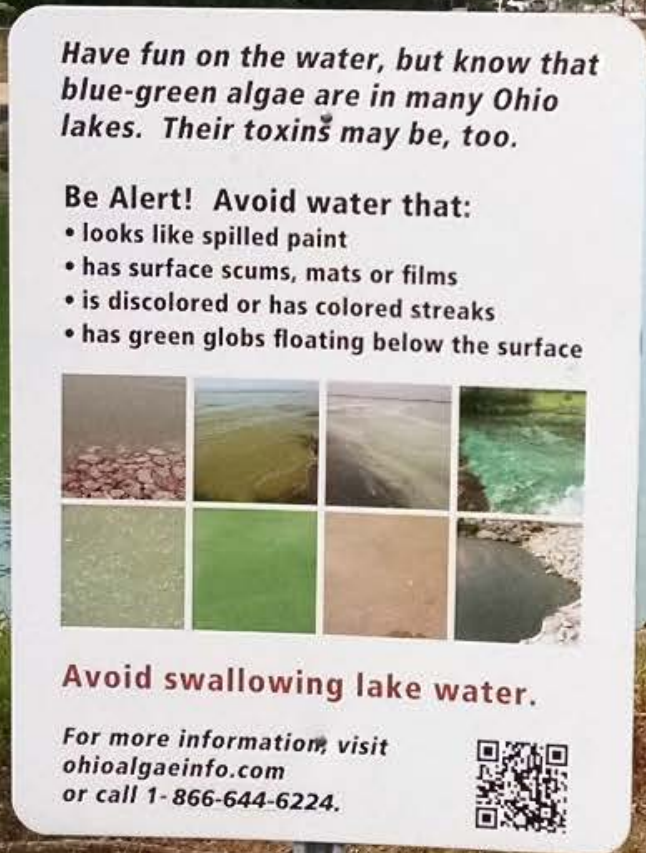


Credit: Joshua Lott/Reuters (2014)

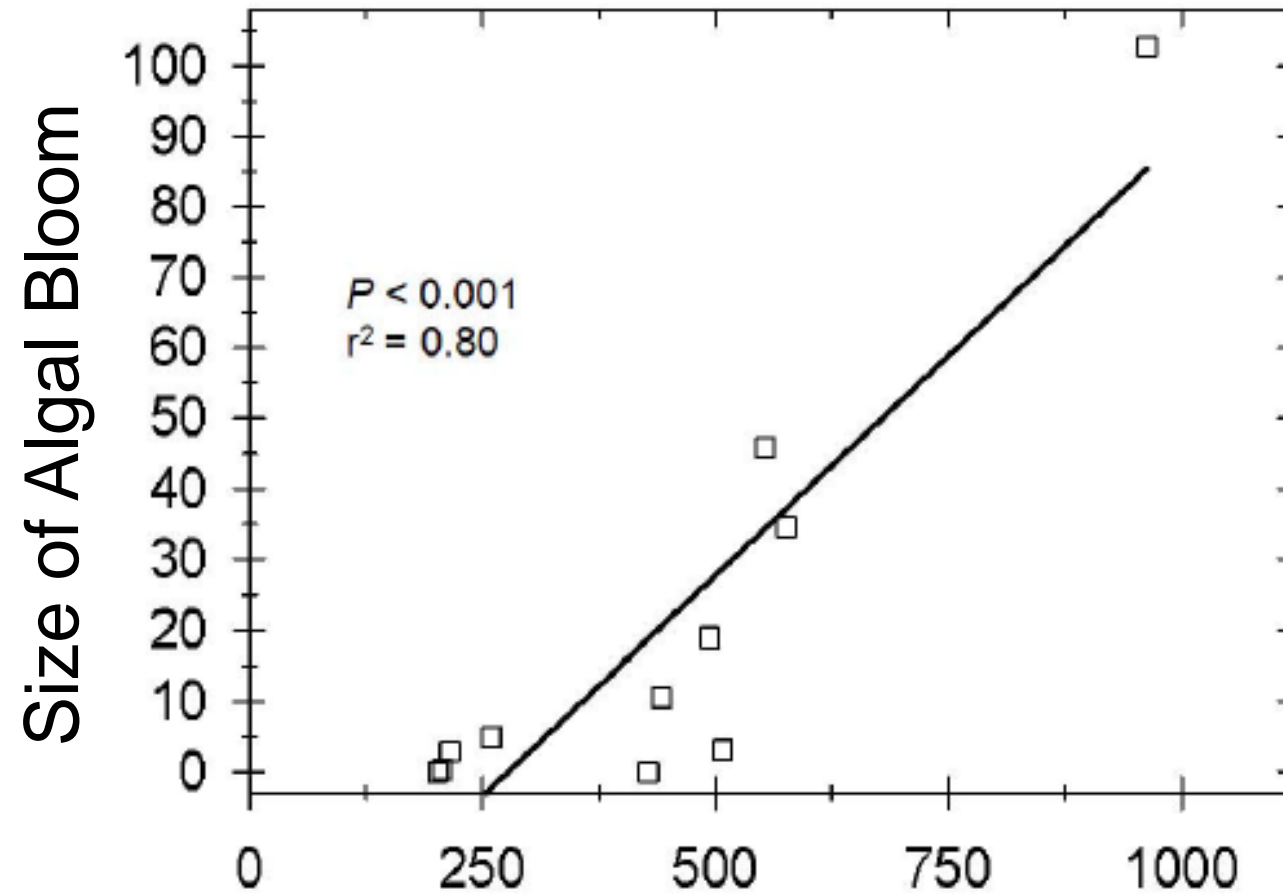
**“400,000 in Ohio without drinking water”
-Chicago Tribune, 8/3/14**







Phosphorus Load Predicts Algal Bloom

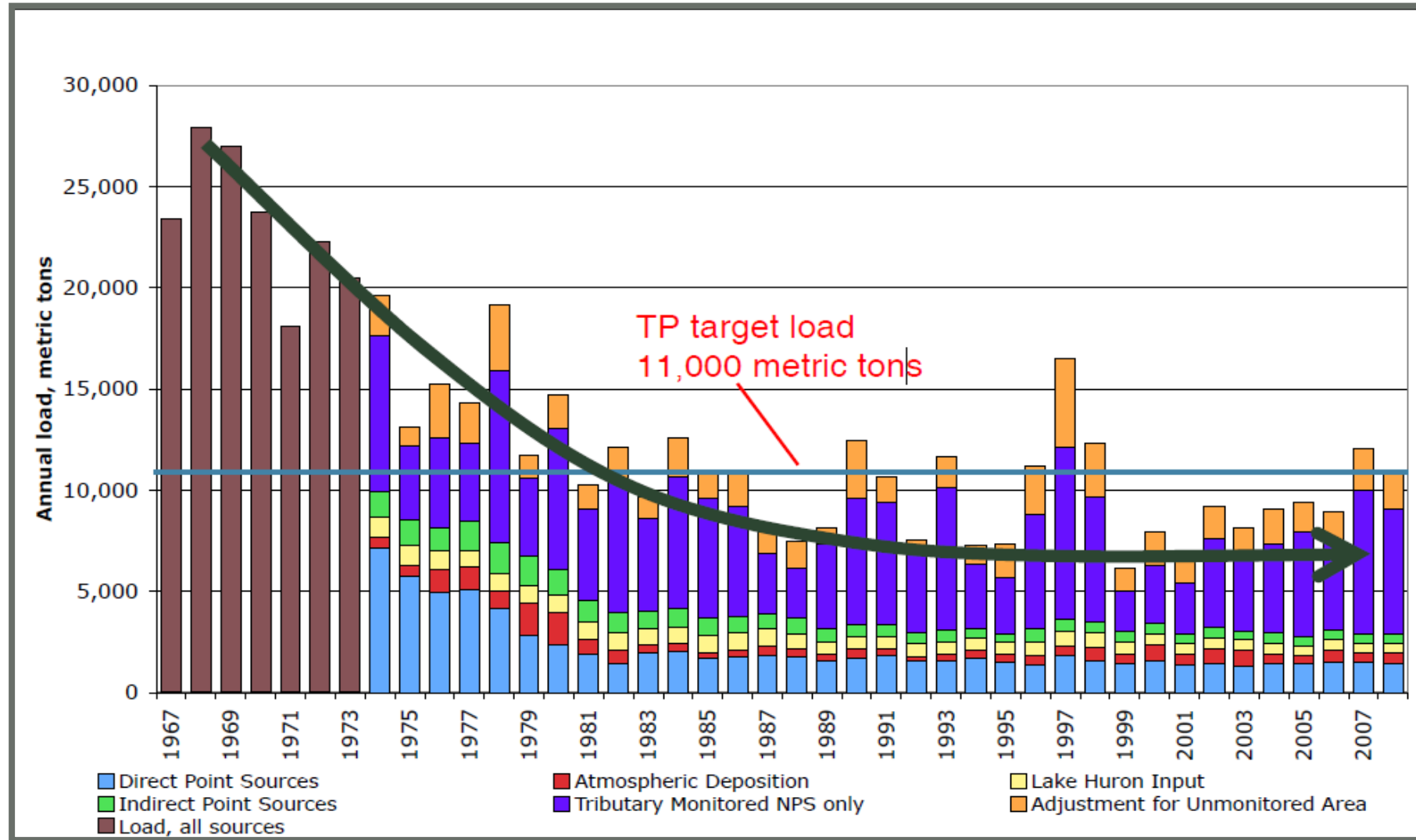


P Load in Maumee River

Kane et al. 2014

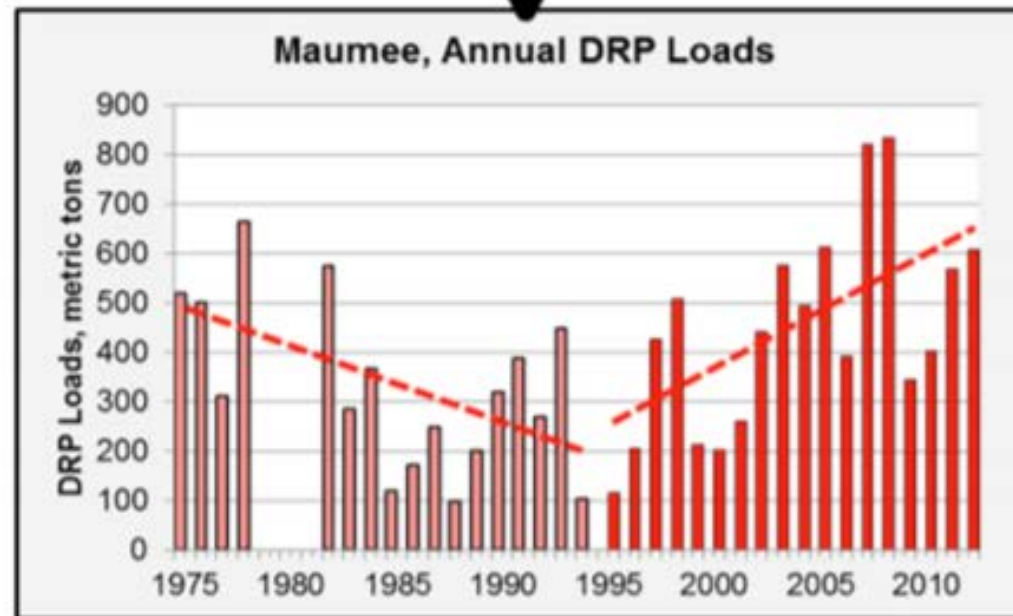
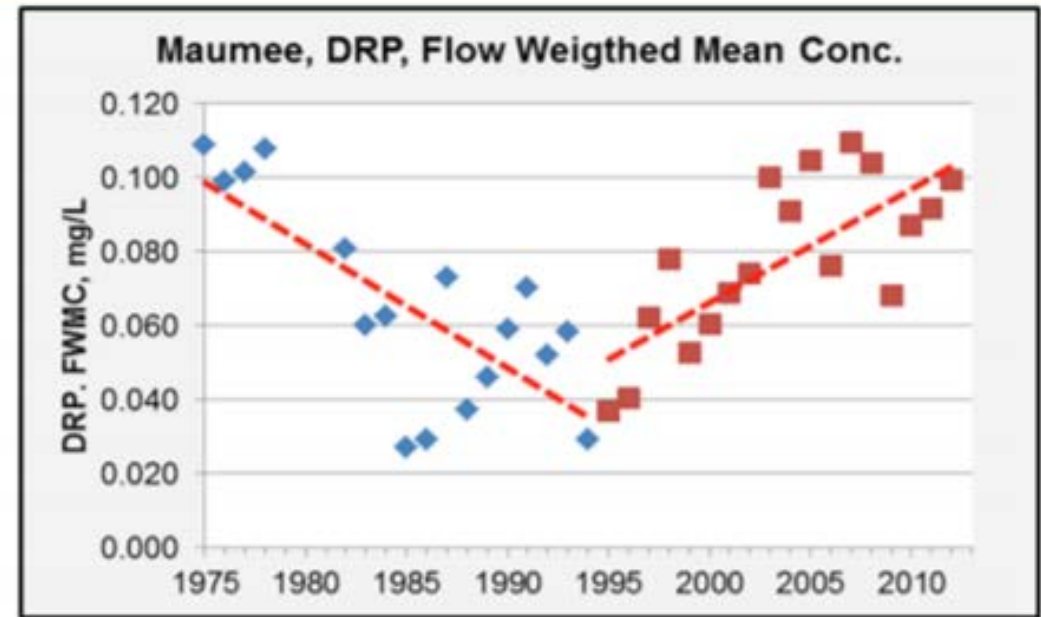
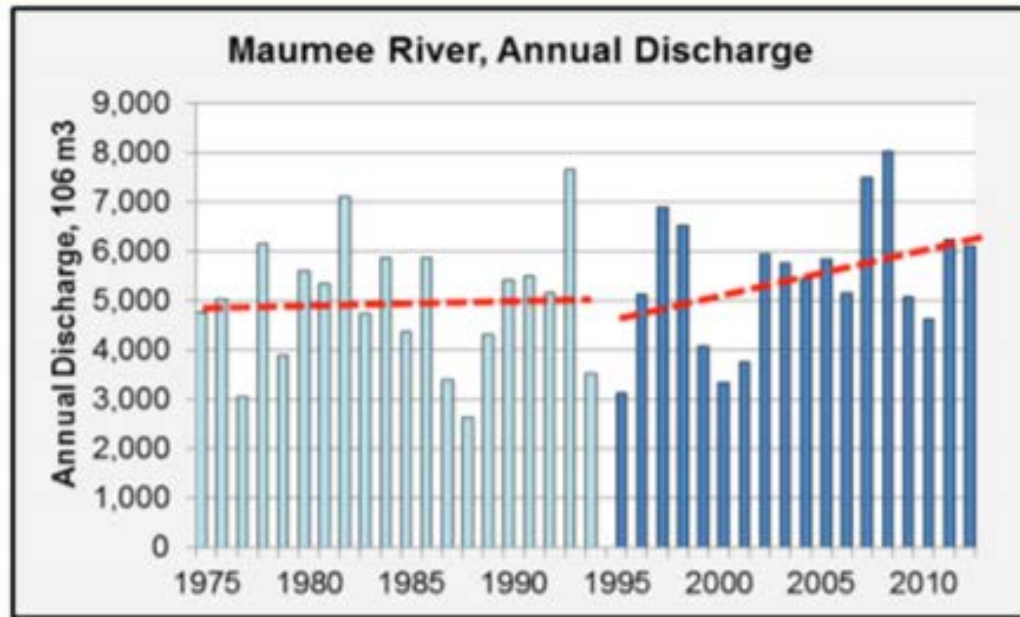


Lake Erie Eutrophication: *Historical Success*



Source: Baker and Richards, Heidelberg University





What is causing the Algal Blooms?

Agriculture

- Fertilization Practices
- Manure
- P Stratification
- Tile Drainage
- Ignoring soluble P
- Larger farm size
- Larger equipment

Urban

- Combined Sewer Overflow
- Stormwater Runoff
- Leaky septic systems

Other Theories

- Glyphosate
- Acid Rain Reduction
- Invasive Species
- Zebra Mussels
- GMOs

“What is Causing the Harmful Algal Blooms in Lake Erie?” Smith et al.,
Journal of Soil and Water Conservation, 2015

Algae covers stretch of beach on Lake Winnipeg



Beachgoers say Grand Beach was covered in green sludge on Monday

Holly Caruk · CBC News · Posted: Aug 15, 2016 9:59 PM CT | Last Updated: August 15, 2016



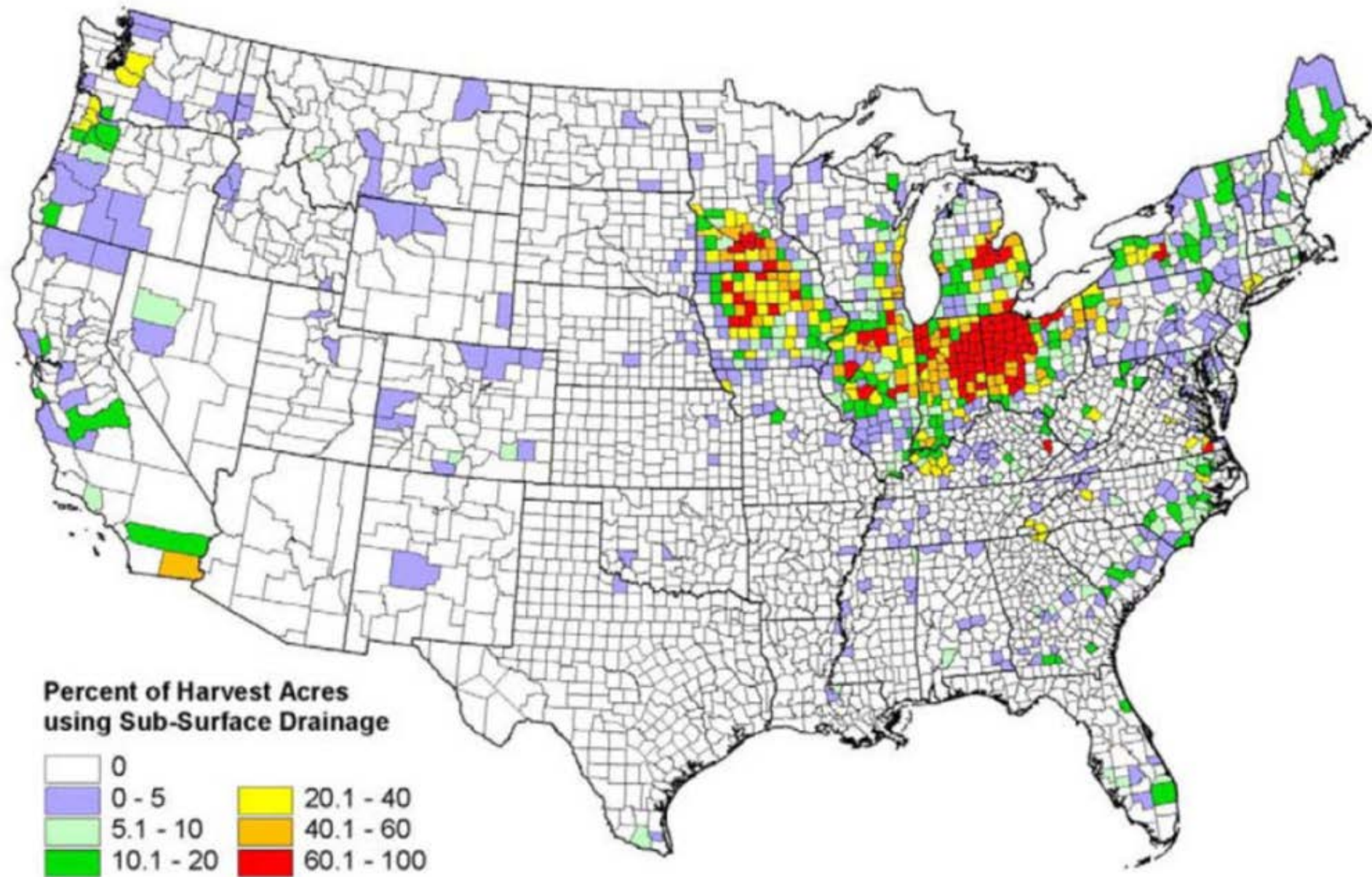
Photo: Harley Hudon



Photo: Monique Andrew



Photo: Gabie Tolkmitt

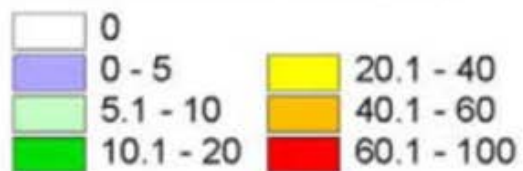


Source: 1992 NRI; 1992 Census of Agriculture

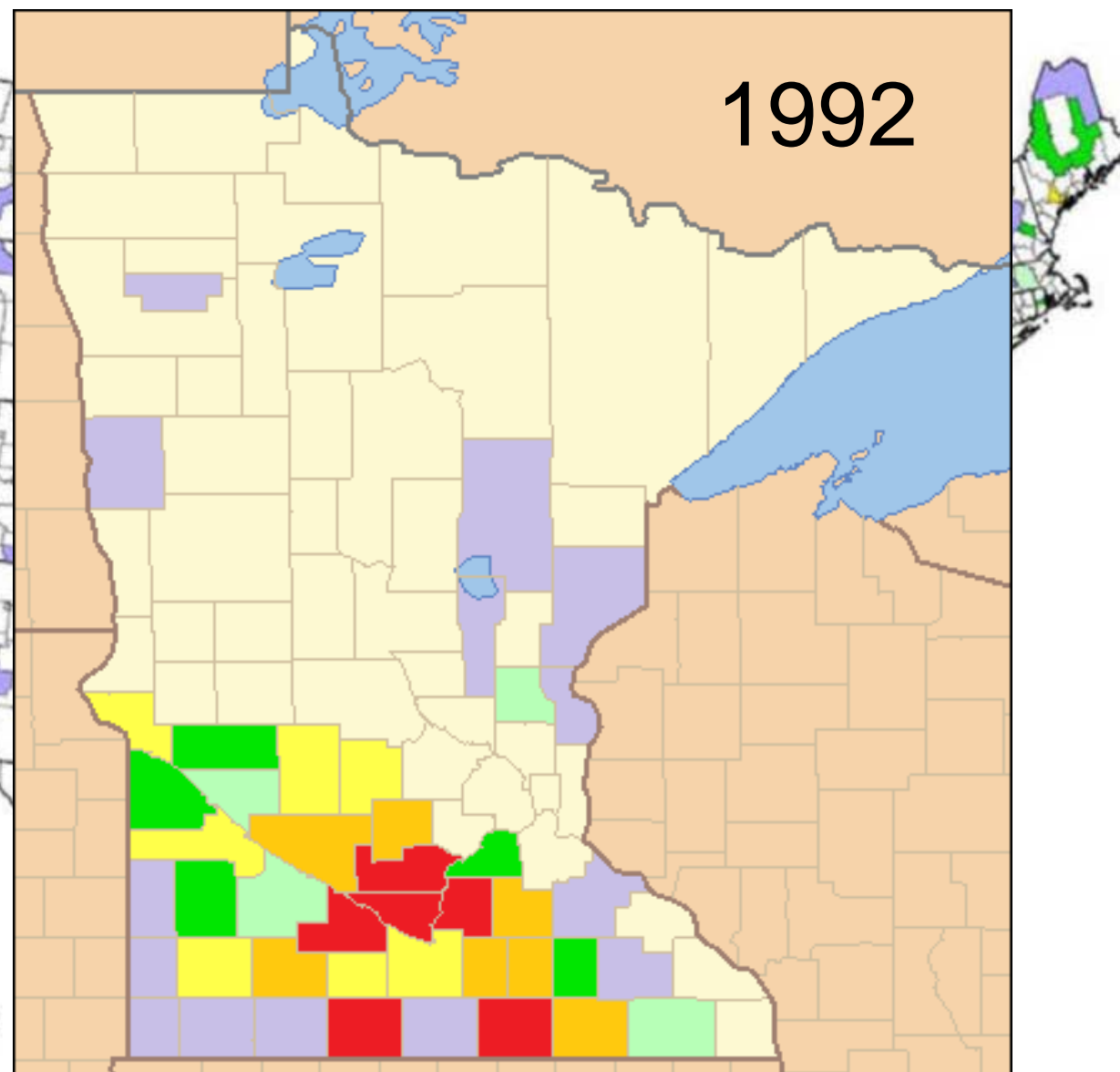
Figure 28 — Percent of harvest acres in the United States using subsurface drainage in 1992.
(NRI Census of Agriculture, 1992)



**Percent of Harvest Acres
using Sub-Surface Drainage**



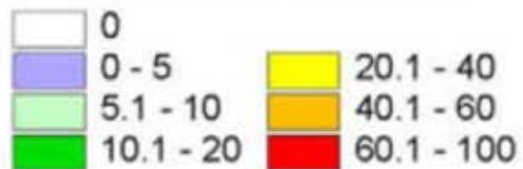
Source: 1992 NRI; 1992 Census of Agriculture



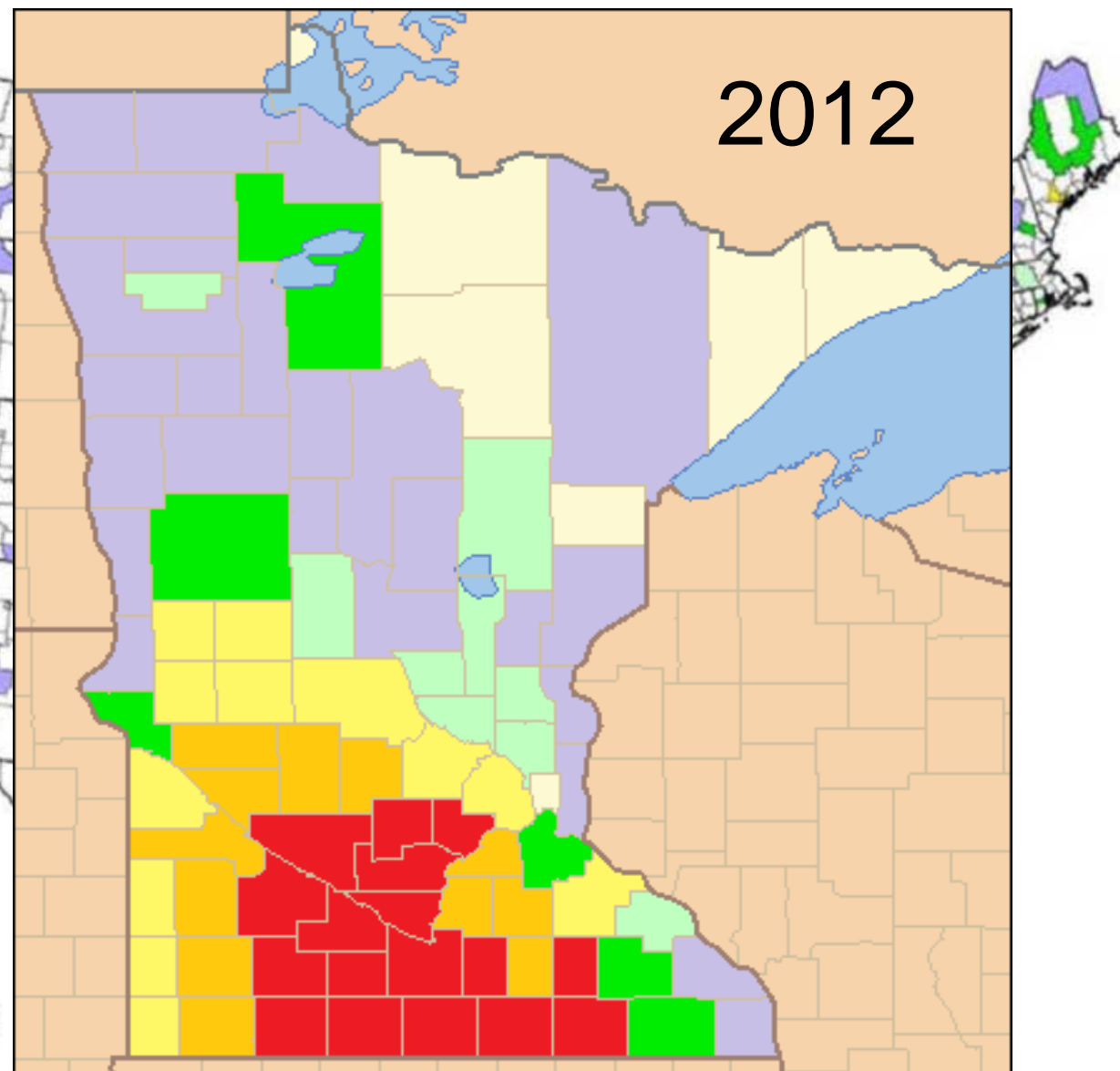
**Figure 28 — Percent of harvest acres in the United States using subsurface drainage in 1992.
(NRI Census of Agriculture, 1992)**



**Percent of Harvest Acres
using Sub-Surface Drainage**



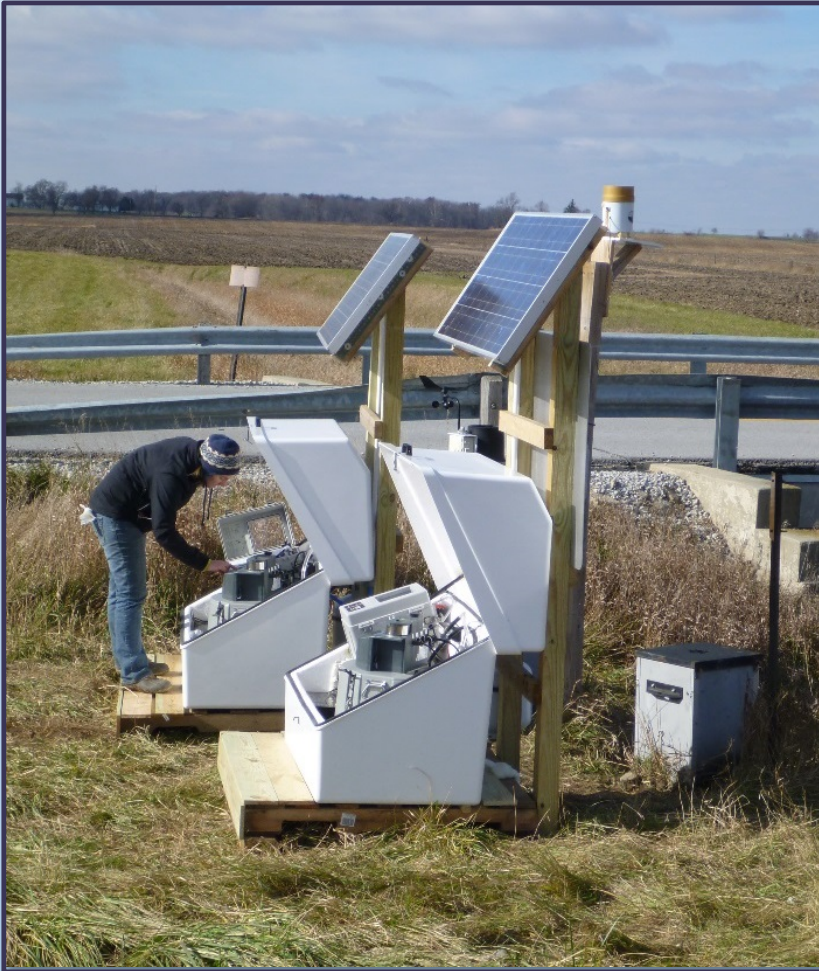
Source: 1992 NRI; 1992 Census of Agriculture



**Figure 28 — Percent of harvest acres in the United States using subsurface drainage in 1992.
(NRI Census of Agriculture, 1992)**

USDA-ARS EDGE-OF-FIELD RESEARCH NETWORK

20 Paired Field Sites



Surface Runoff



Subsurface Drainage



USDA-ARS EDGE-OF-FIELD RESEARCH NETWORK





Potential Sources of Phosphorus: Surface Runoff vs Tile Drainage

Surface Runoff vs Tile Drainage

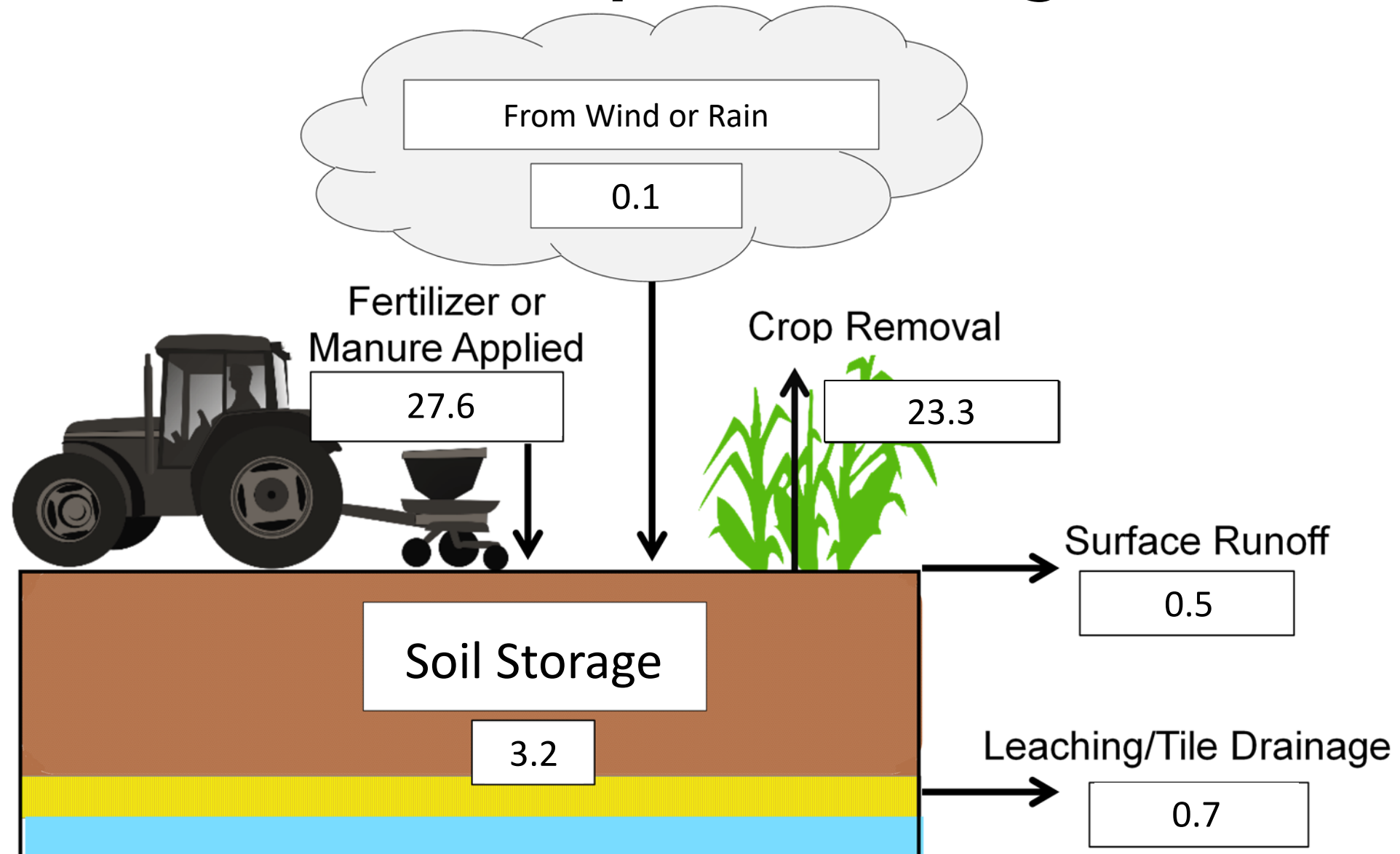


- High flows
 - Infrequent
 - High P
-
- Fast, intense P loss

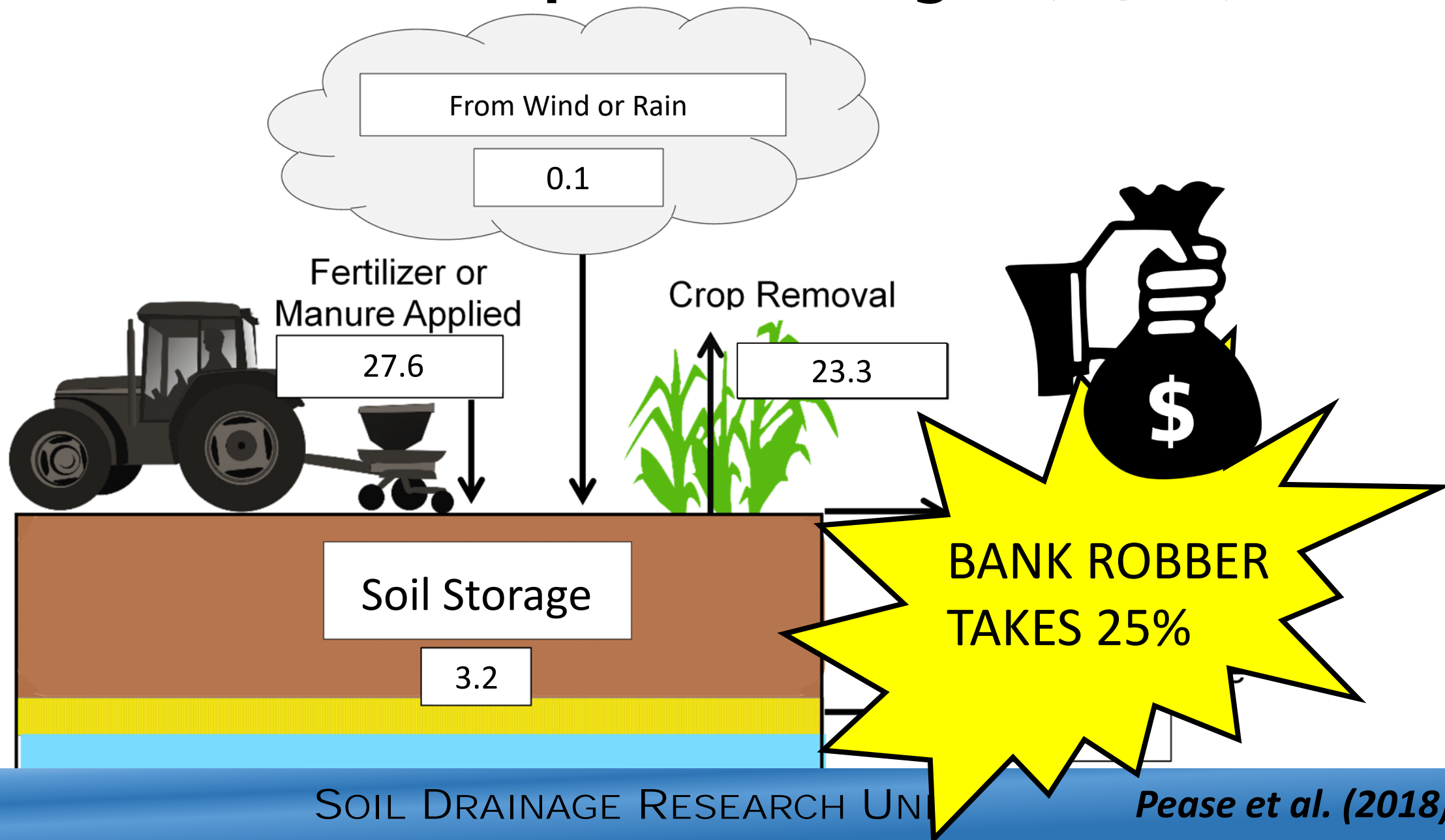


- Low flows
 - Daily
 - Low P
-
- Slow, steady P loss

Ohio Total Phosphorus Budget (lb/ac)



Ohio Total Phosphorus Budget (lb/ac)



4R Principles of Nutrient Stewardship



RIGHT SOURCE

Matches fertilizer type to crop needs.



RIGHT RATE

Matches amount of fertilizer to crop needs.



RIGHT TIME

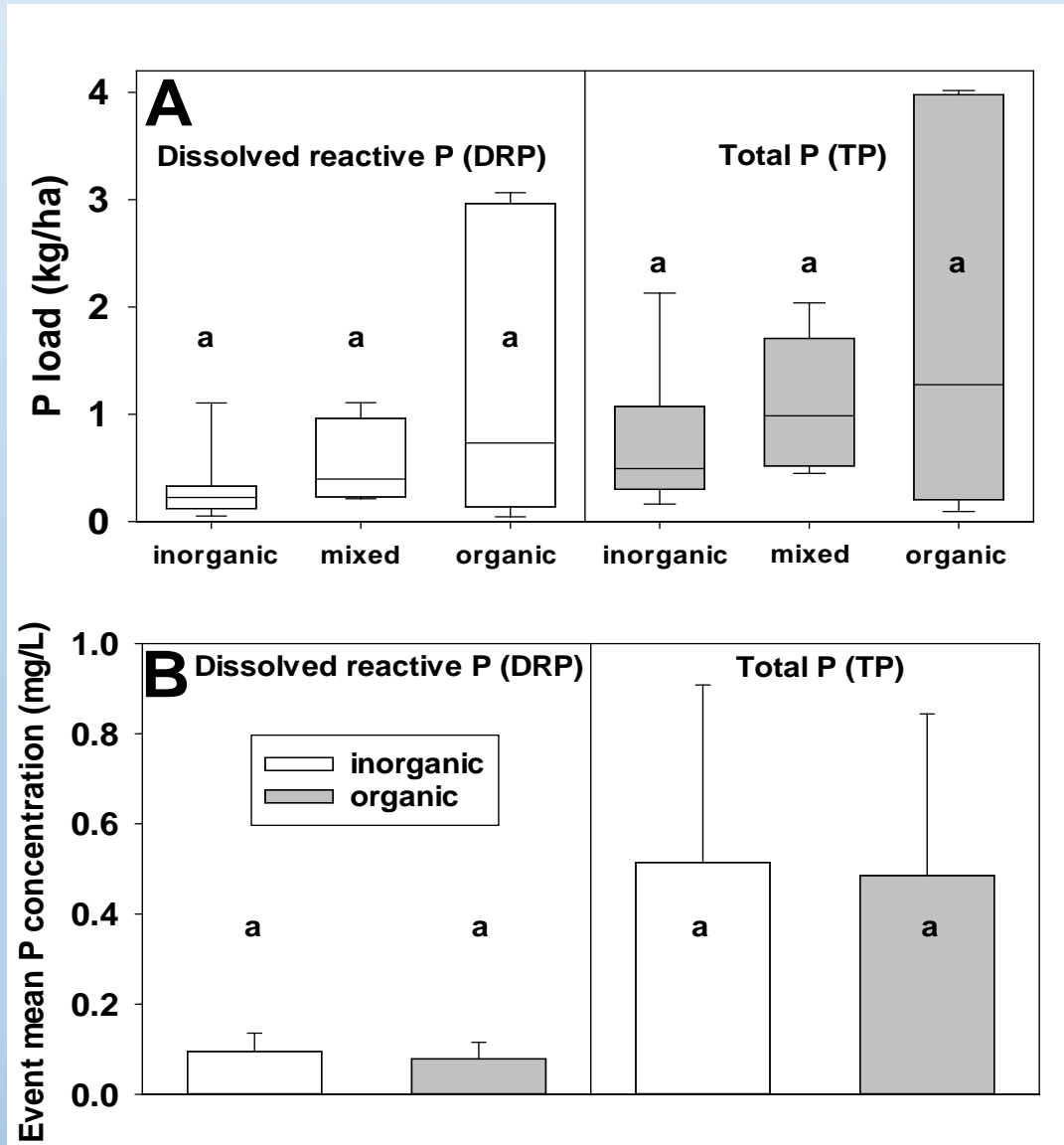
Makes nutrients available when crops need them.



RIGHT PLACE

Keeps nutrients where crops can use them.

Fertilizer Source & Rate: Account for P in Your Soil



4R Principles of Nutrient Stewardship



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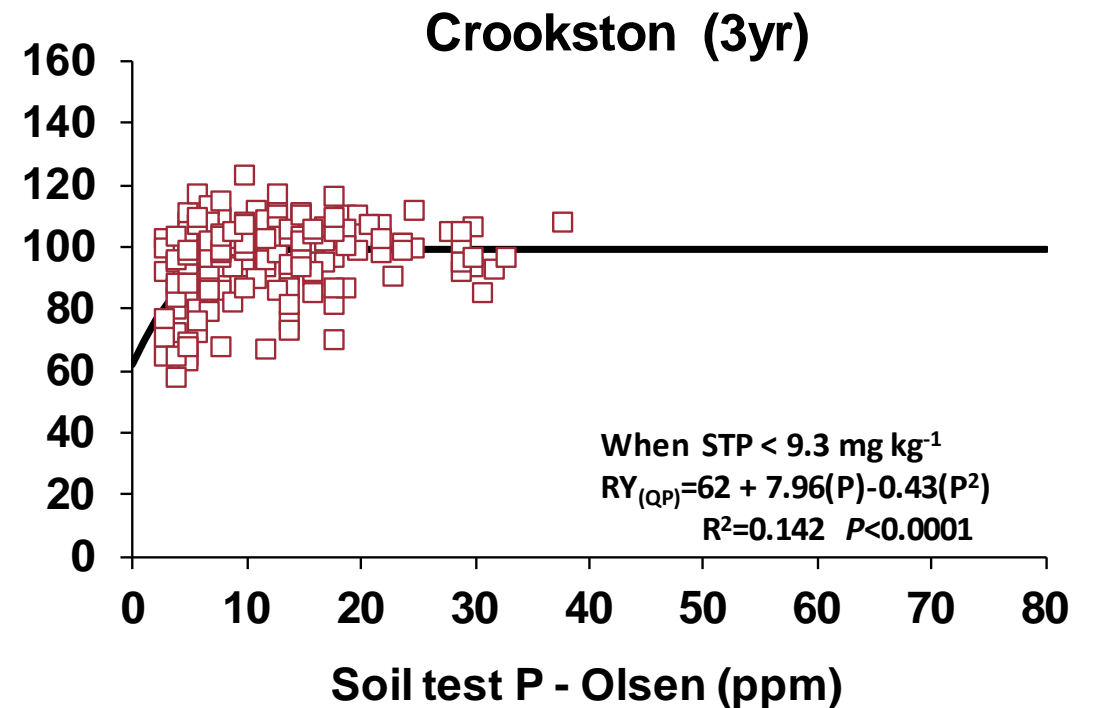
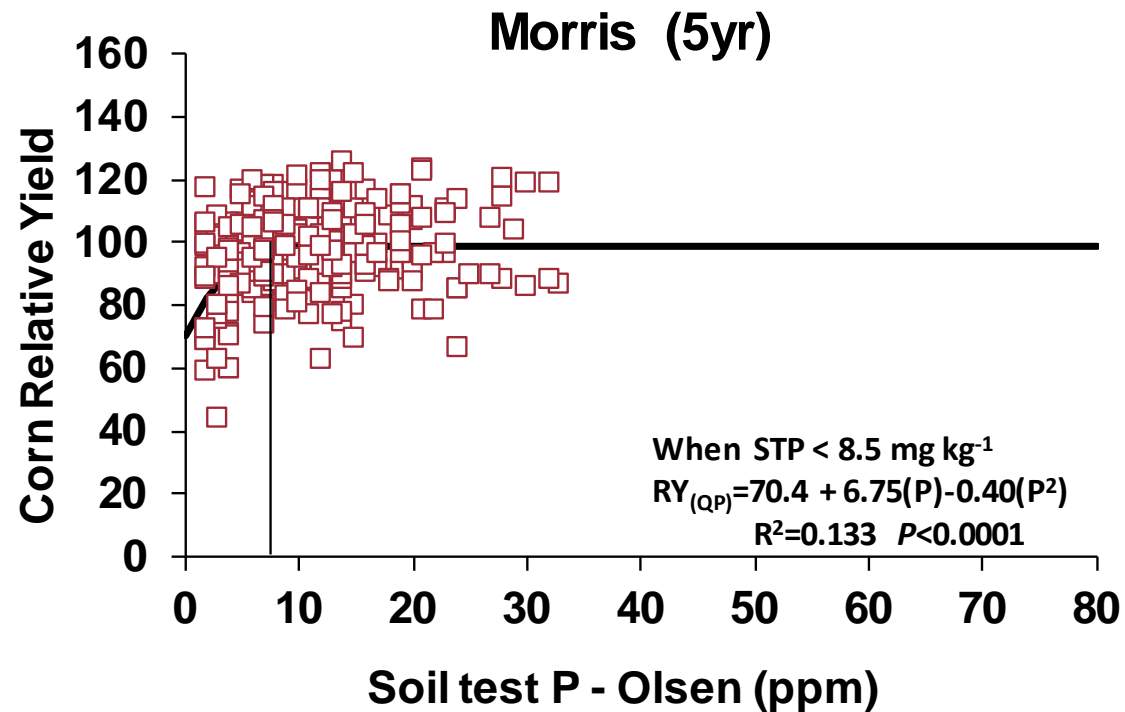


RIGHT PLACE

Keeps nutrients where crops can use them.

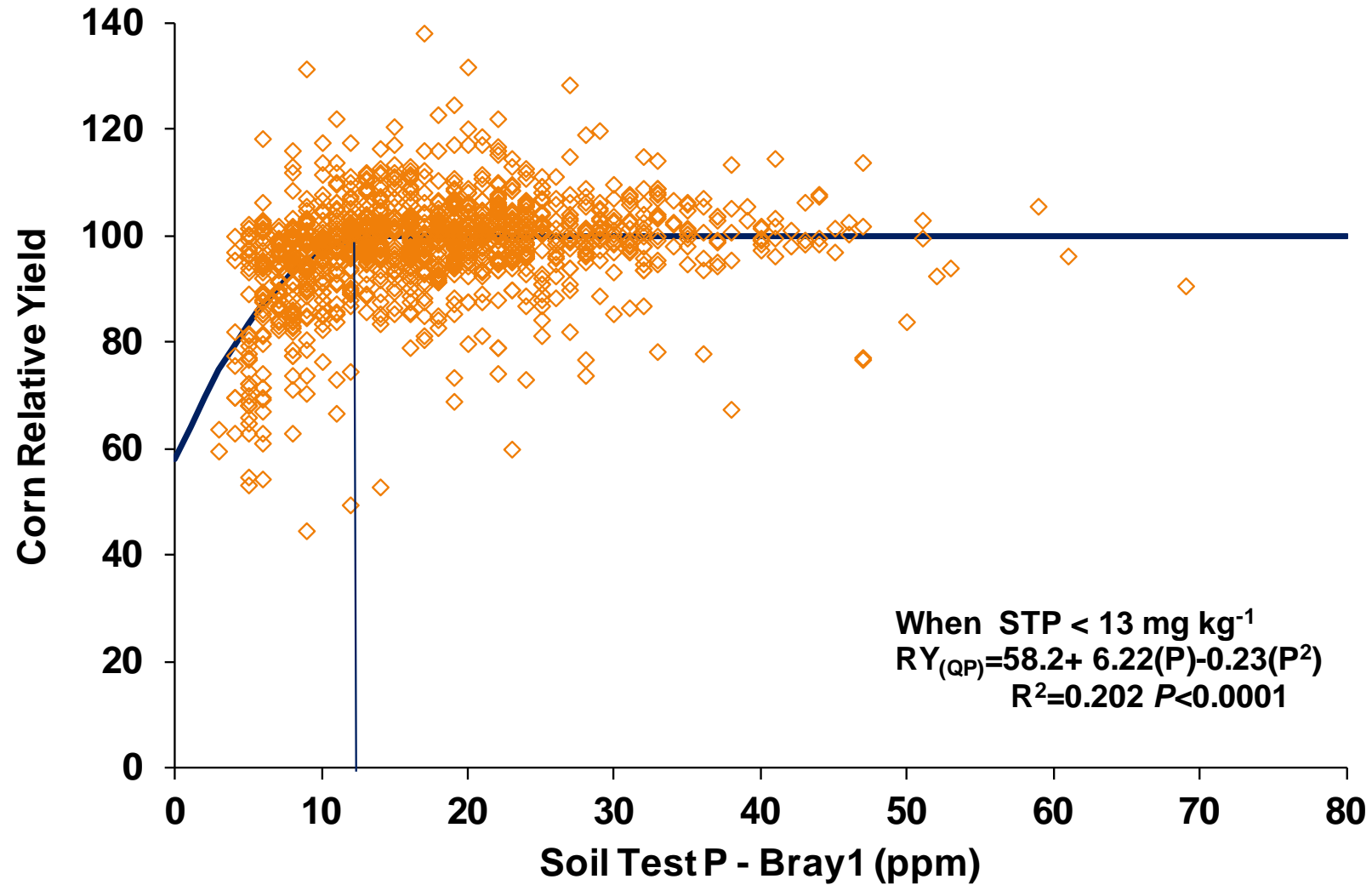


Relative Corn Yield × STP

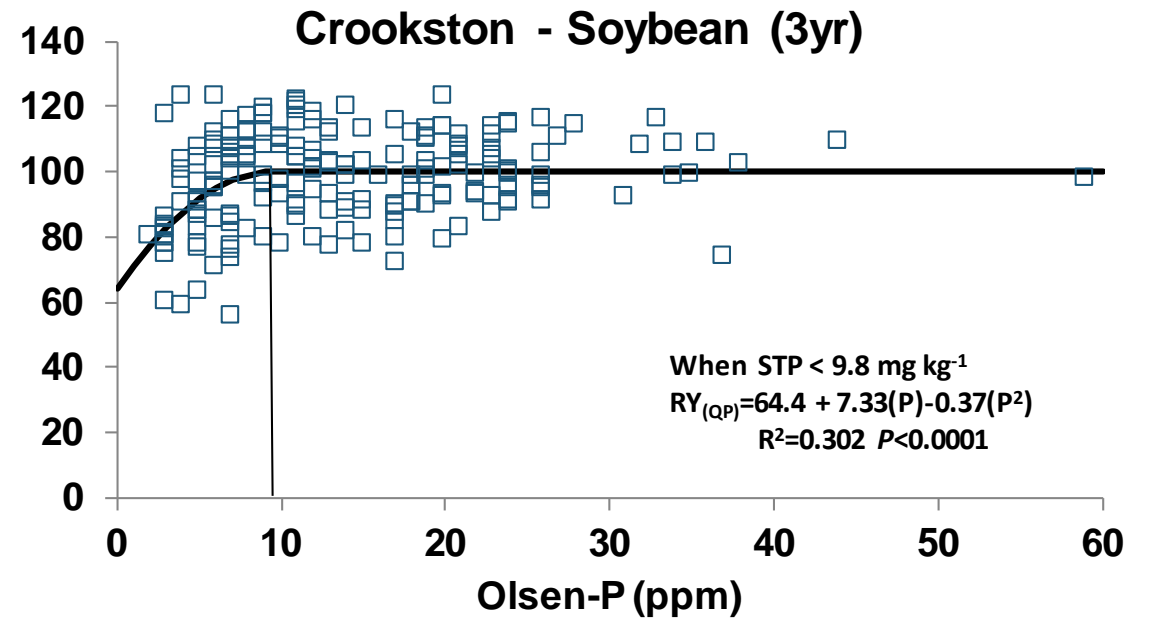
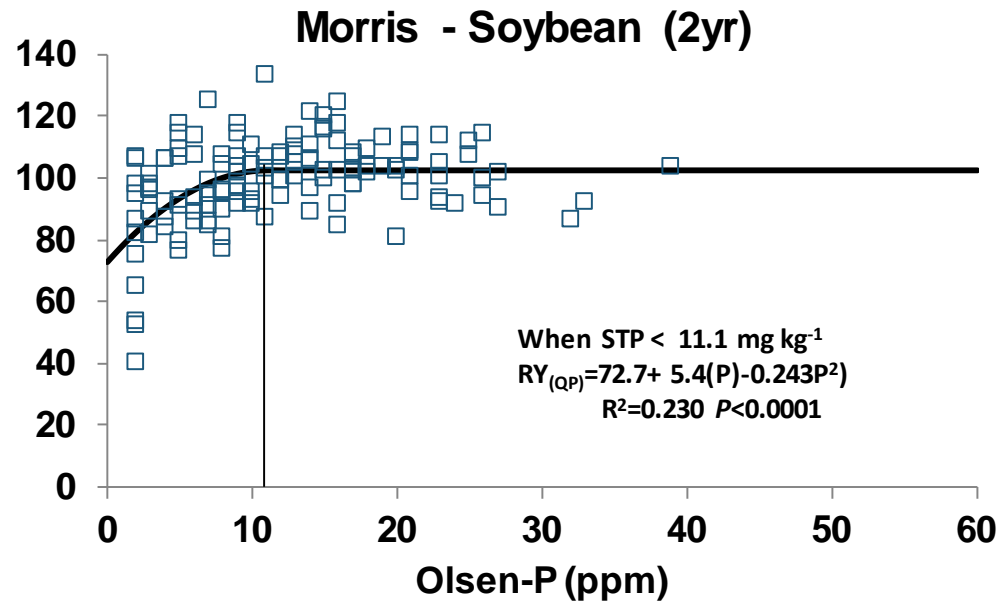




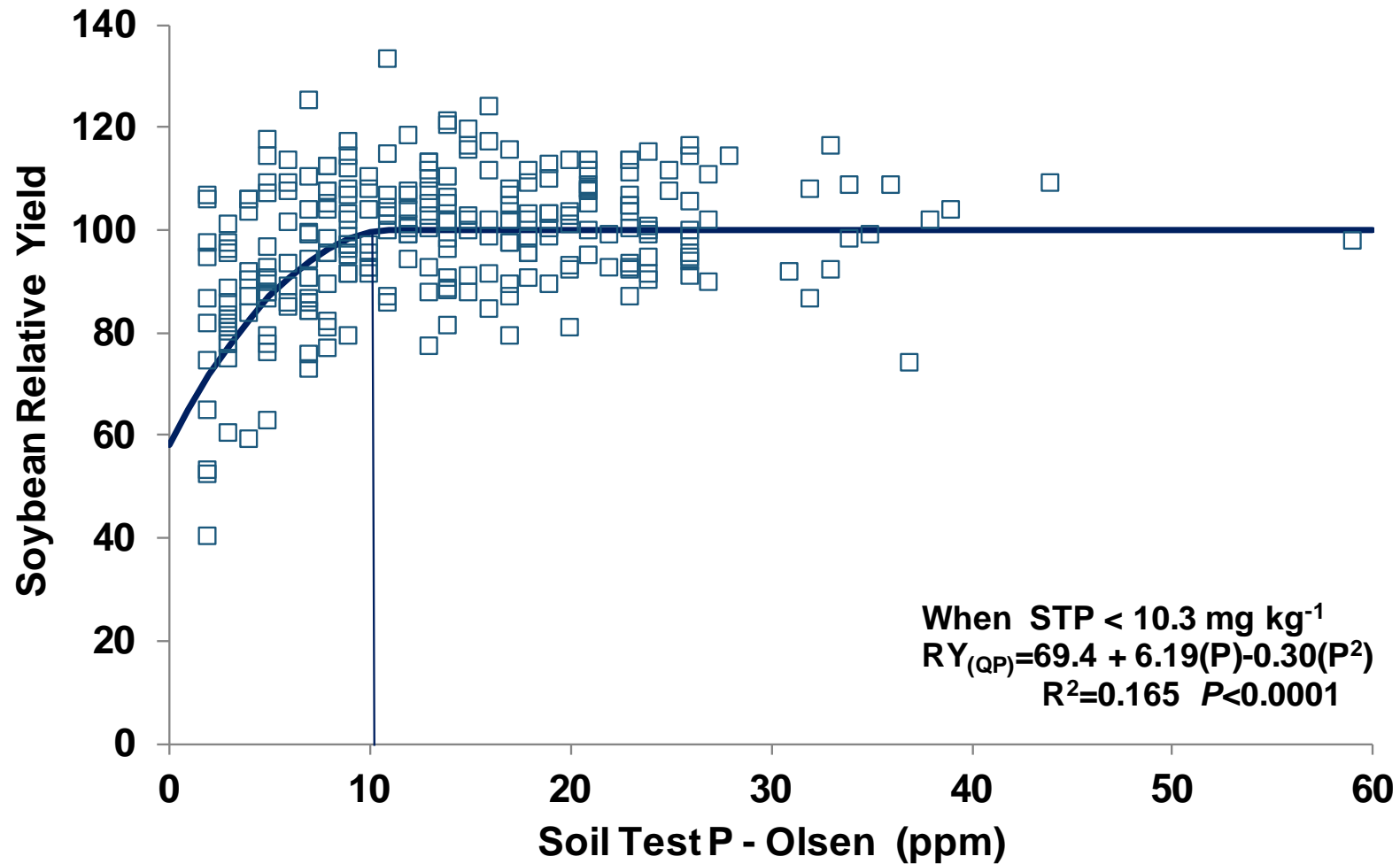
Relative Corn Yield × STP



Relative Soybean Yield × STP



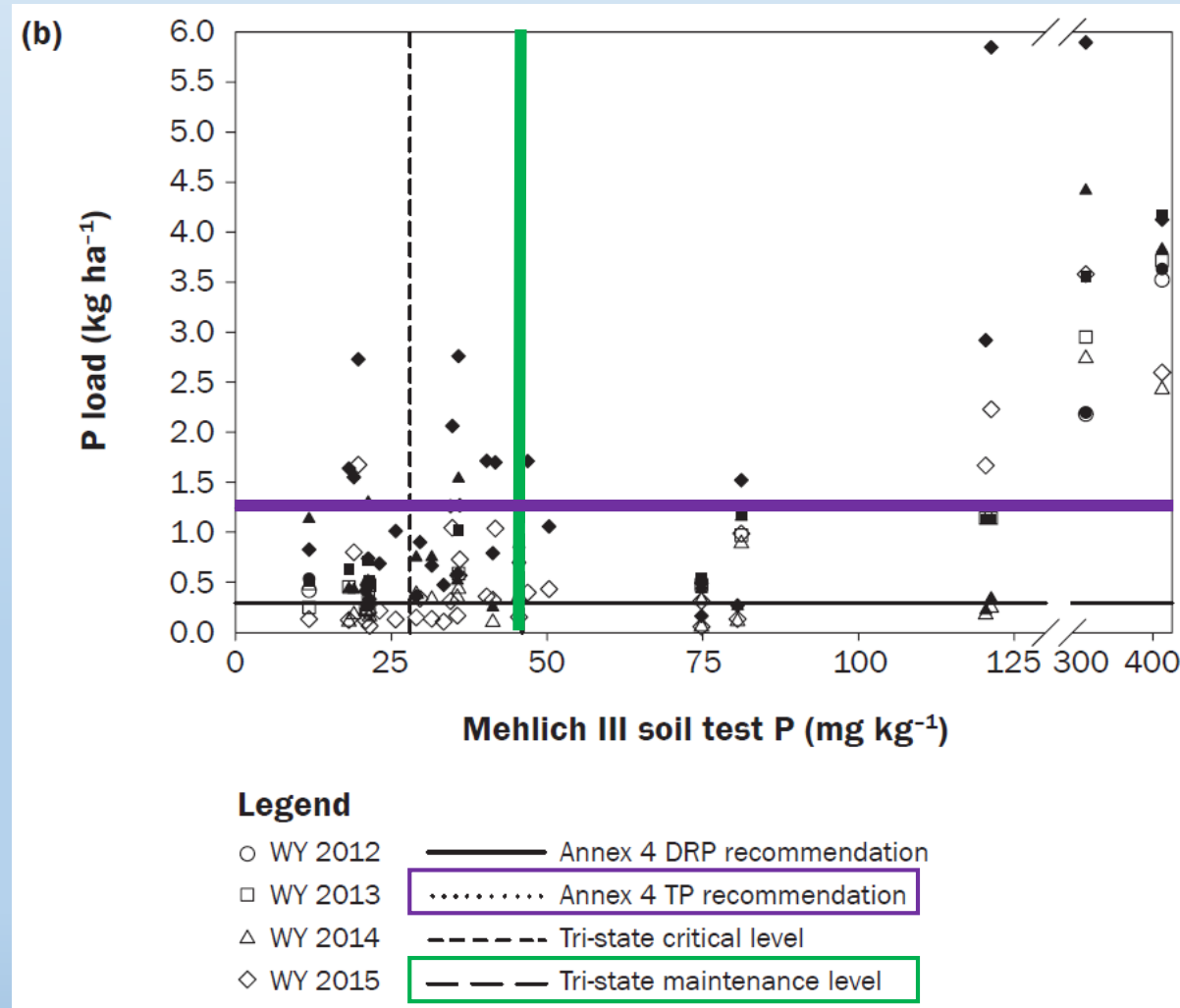
Relative Soybean Yield × STP



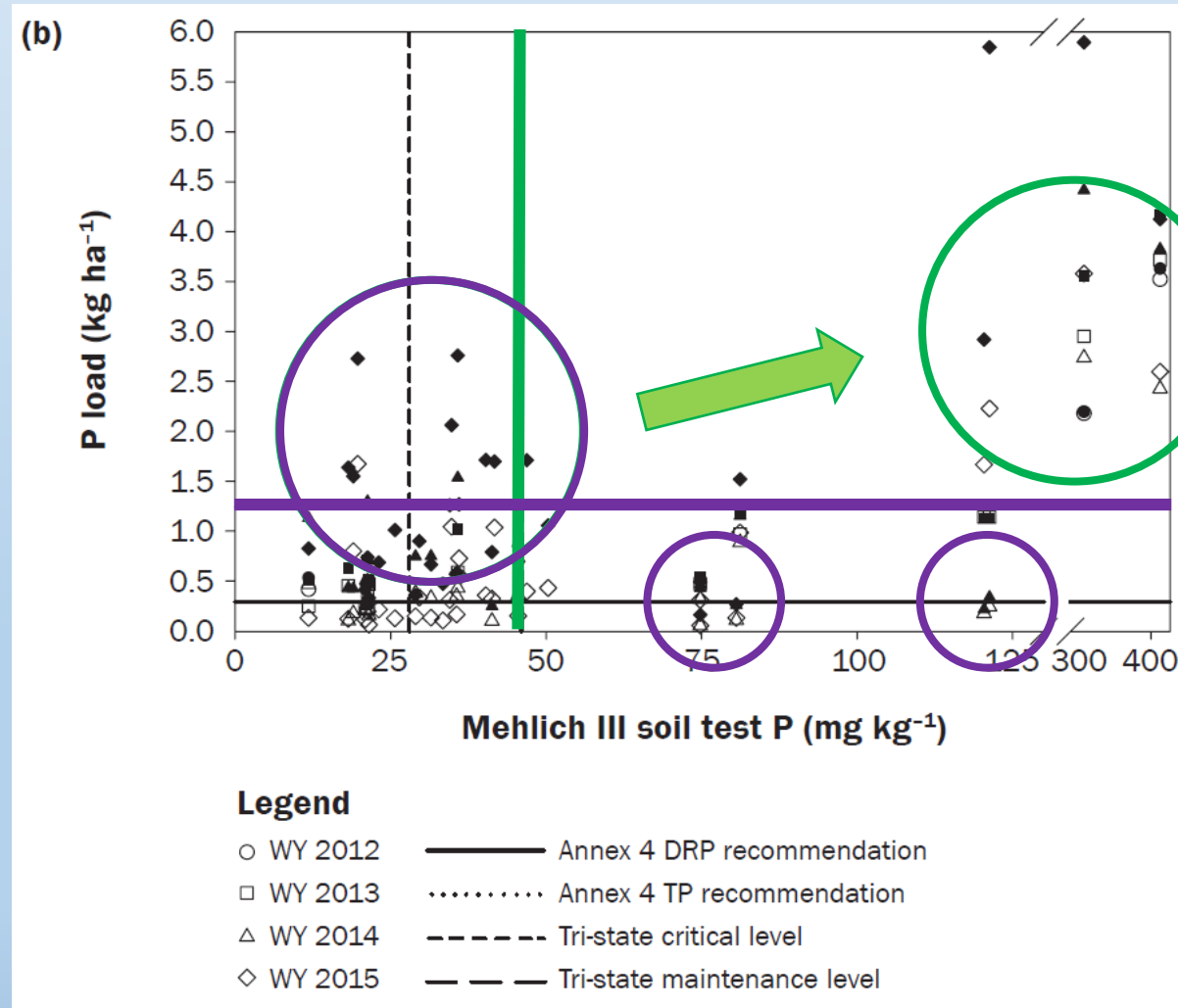
Soil test phosphorus (P) Interpretation Classes and associated extracted-P concentrations used in Minnesota.

| | Minnesota STP Category | | | | |
|------------|-----------------------------|------|--------|-------|-----------|
| Extractant | Very Low | Low | Medium | High | Very High |
| | ----- ppm P extracted ----- | | | | |
| Bray-P | 0-5 | 6-11 | 12-15 | 16-20 | 21+ |
| Olsen-P | 0-3 | 4-7 | 8-11 | 12-15 | 16+ |

Soil Test P is One Indicator of P Loss Risk



Soil Test P is One Indicator of P Loss Risk



Soil Test P above economic rates poses a P loss risk

BUT Soil Test P does not equal P loss risk

4R Principles of Nutrient Stewardship



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Matches fertilizer type to crop needs.



RIGHT RATE

Matches amount of fertilizer to crop needs.



RIGHT TIME

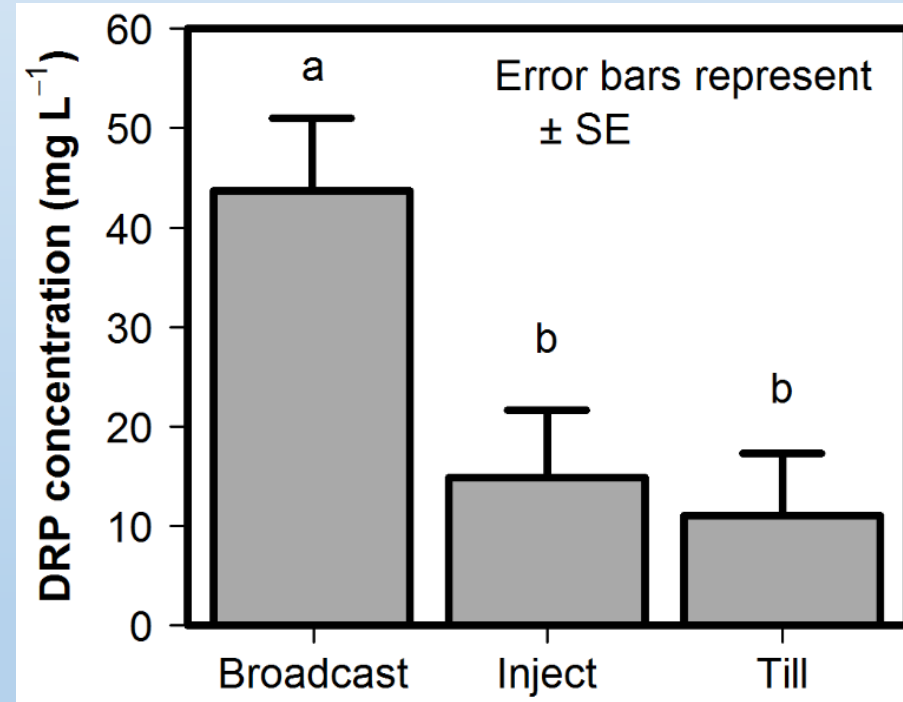
Makes nutrients available when crops need them.



RIGHT PLACE

Keeps nutrients where crops can use them.

Fertilizer Placement



70% reduction in DRP concentration when fertilizer was injected or tilled into the soil



Preferential Flow Pathways



Phosphorus Management

- Don't use your soil as a bank
- Over-application of P fertilizer isn't economical

To reduce loss risk:

- Fertilize for each crop
- Band or incorporate P fertilizer



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