

Update to the Trenches: Moving Farmers Forward on Nutrient Management and Soil Health

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Small Changes. Big Impact.



What is NMSH?

collaborative effort

address concerns in a way that makes sense

position Indiana as a leader in resource management and protection

branding and marketing

Why?

- reduce nutrient loss
- head off impractical regulatory decisions
- improve water quality

Partners



- Indiana Soybean Alliance
- Indiana Pork
- Indiana State Poultry Association
- Indiana Corn Marketing Council
- Agribusiness Council of Indiana
- Indiana Corn Growers Association
- Indiana Beef Cattle Association
- Indiana Dairy Producers
- Indiana Farm Bureau
- Purdue Agricultural Research and Extension
- Indiana Certified Crop Adviser Program

Partners



**Contributors to
make this
successful**

- Universities
- Agencies
- Conservation organizations
- Watershed groups
- Ag retailers
- Certified crop advisors
- Farmers

How to Implement Change

Long-term
strategy with
intentional
actions by all
partners

- awareness
- research
- monitoring
- education
- implementation



AWARENESS





Source: ISDA



Source: Ohio EPA



Source: ISDA

Toxic algae bloom found in Ohio River

OTHER NEWS

» Summer's toxic-algae bloom on Lake Erie was the worst

By [Laura Arensfield](#)

The Columbus Dispatch • Friday August 21, 2015 10:06 PM

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SCIENCE

AUG 4 2014, 5:49 PM ET

Toxic Algae Blooms to Persist on Lake Erie, Experts Say

by JOHN ROACH

Algae blooms on Lake Erie on Oct. 5, 2011. [NASA / AP](#), file

SHARE

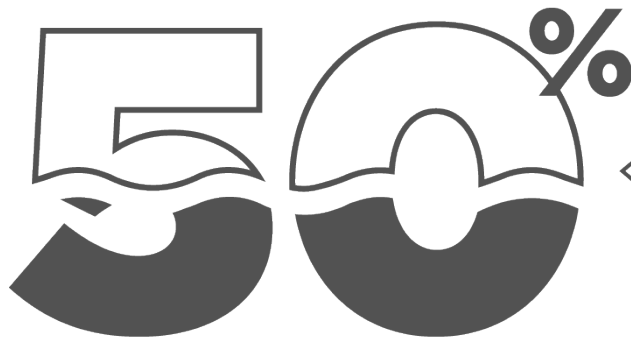
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Toledo's drinking water is once again safe, Mayor Michael Collins announced as he took a sip from a glass at a Monday morning news conference — but scientists

advertisement

Microsoft Cloud

Are there nutrient problems?



About half of Indiana's farmers either don't know of or don't see specific water pollutant problems in their area¹

RESEARCH & MONITORING



BEST MANAGEMENT PRACTICES

76%
of farmers

Perform regular soil sampling¹

27%
of farmers

Implement nutrient management plans (manure, nitrogen & phosphorous)¹

15%
of farmers

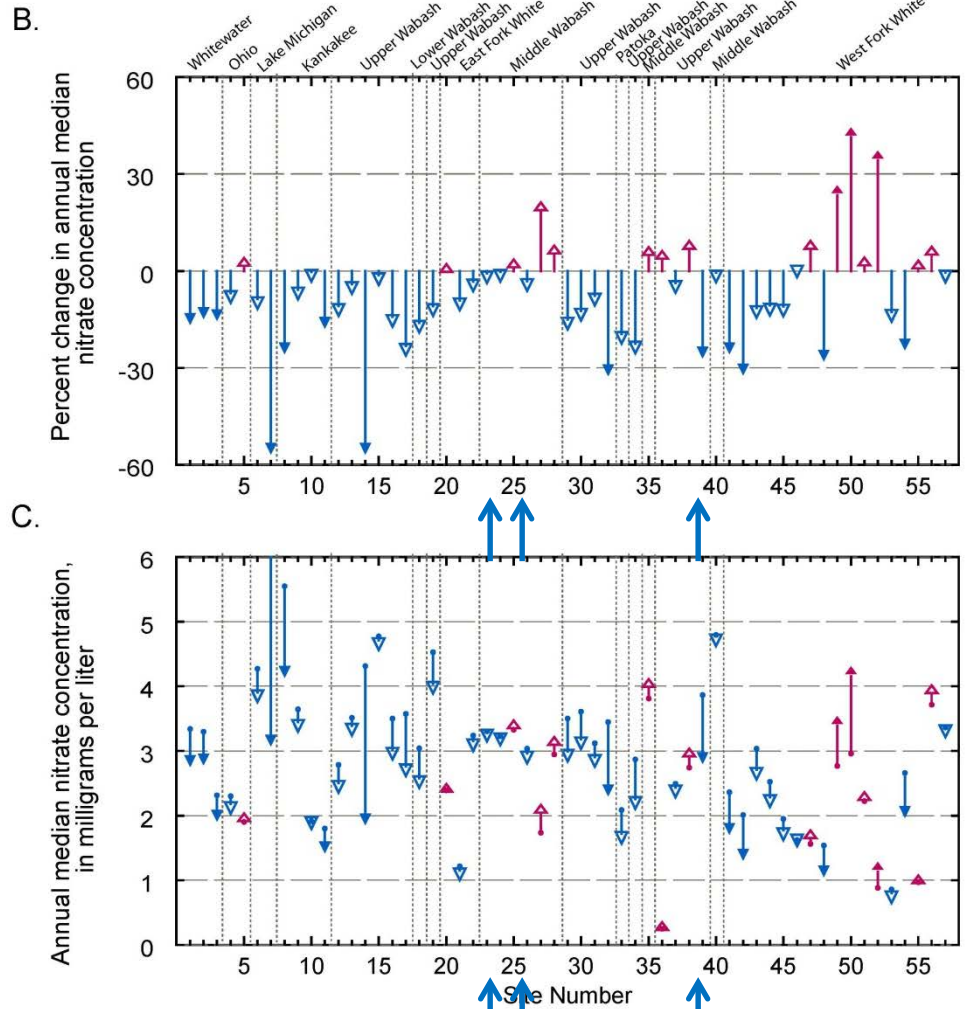
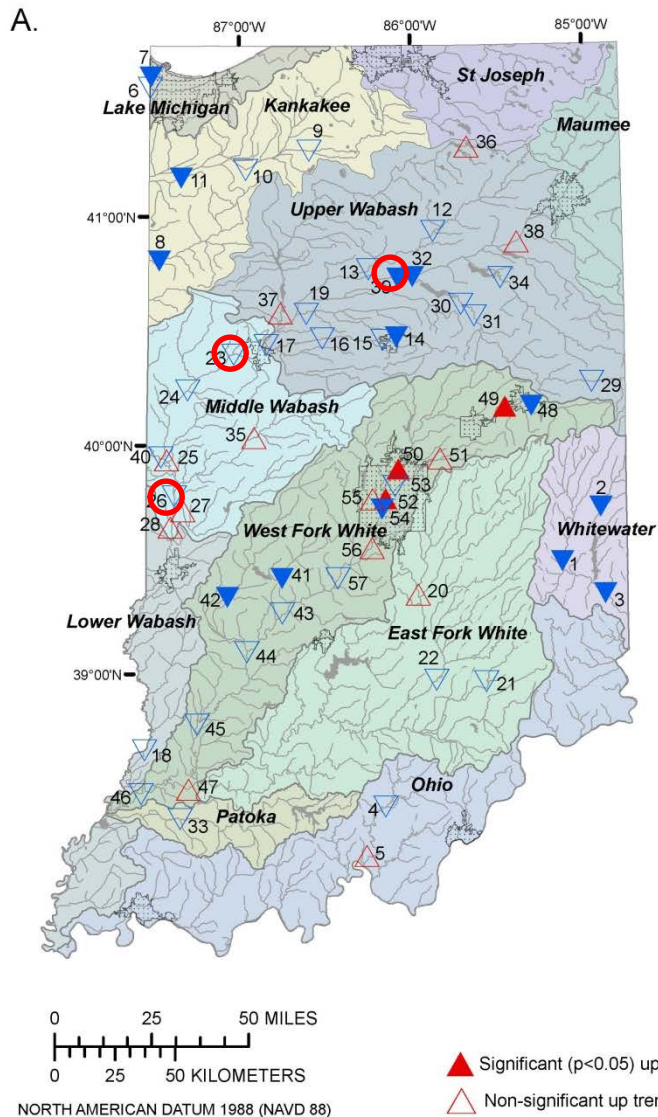
Planted cover crops in the last five years²



- Strategic crop rotation
- Buffer strip programs
- Drainage and ditch management

¹Stalker Prokopy, L. and J. Ulrich-Schad. 2014. Understanding Nutrient Management Decisions: Examination of the Agricultural Community in Indiana. Purdue University, Department of Forestry and Natural Resources, Natural Resources Social Science Lab.

²Singer, J. Cover crops in the Corn Belt: Survey finds underused potential as conservation tool. Iowa State University. Leopold Center for Sustainable Agriculture. Accessed February 2014. Retrieved from: <http://www.leopold.iastate.edu/news/leopold-letter/2006/winter/cover-crops-corn-belt-survey-finds-underused-potential-conservation>.

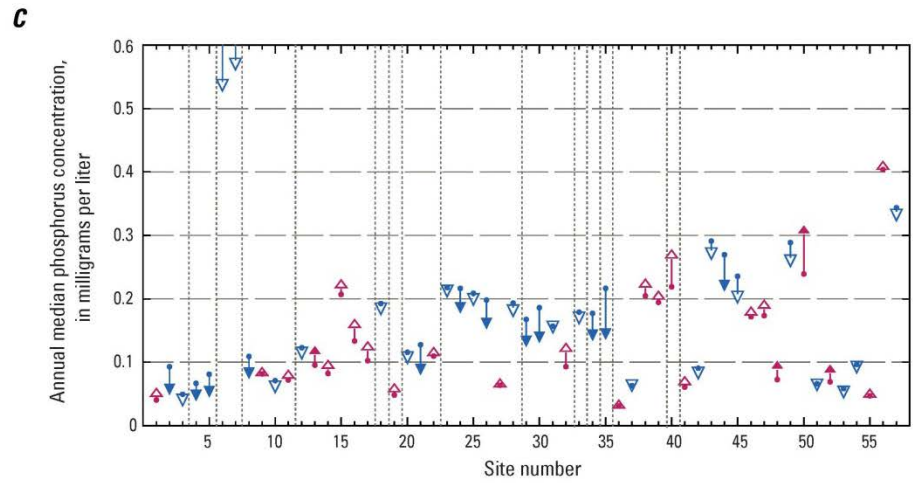
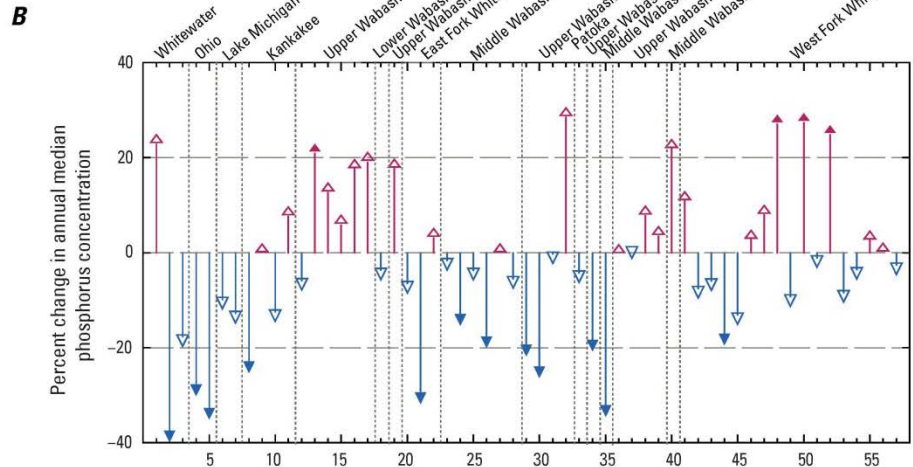
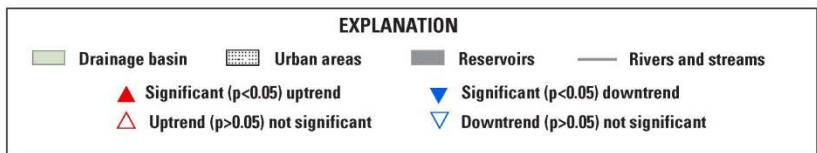
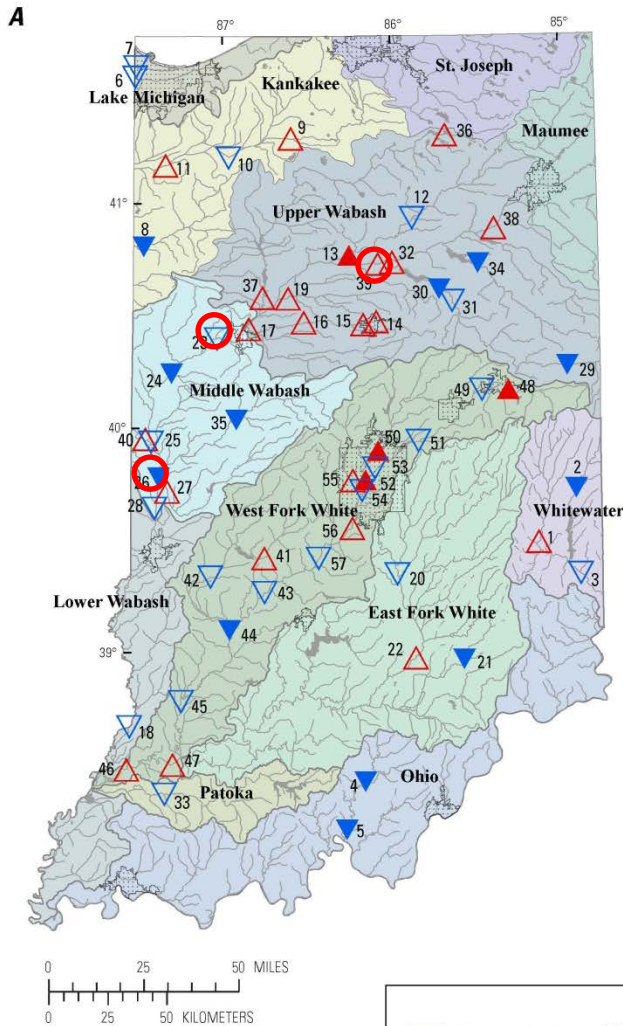


EXPLANATION

- ▲ Significant ($p < 0.05$) up trend
- ▼ Significant ($p < 0.05$) down trend
- ▬ River and streams
- ▭ Drainage basin
- △ Non-significant up trend
- ▽ Non-significant down trend
- ▨ Urban areas
- Reservoirs



Nitrate: 74% percent of sites show decrease; statistically significant: 3 uptrends and 13 downtrends



Total phosphorus: 58% percent of sites show decrease; statistically significant: 3 uptrends and 13 downtrends

Data Analysis Trends

- Overall: POSITIVE
- Soil P levels: DECLINING
- Impaired waters: SLIGHTLY IMPROVING
- Management techniques: WORKING
- Practices: NOT EQUAL
- Fields: SOME HIGH CONTRIBUTORS
- Water quality: SLOW TO SHOW SIGNIFICANT IMPROVEMENT
- Impairment listings: LOTS

Monitoring Goal

- Continued improvement with linkage to farmer action
 - Farmer attitude
 - Practice implementation
 - Nutrient retention in fields
 - Positive aquatic life response
 - Reduced nutrient loads in waterbodies
 - Fewer algal blooms



EDUCATION





Ways to Improve

Regulatory Initiatives

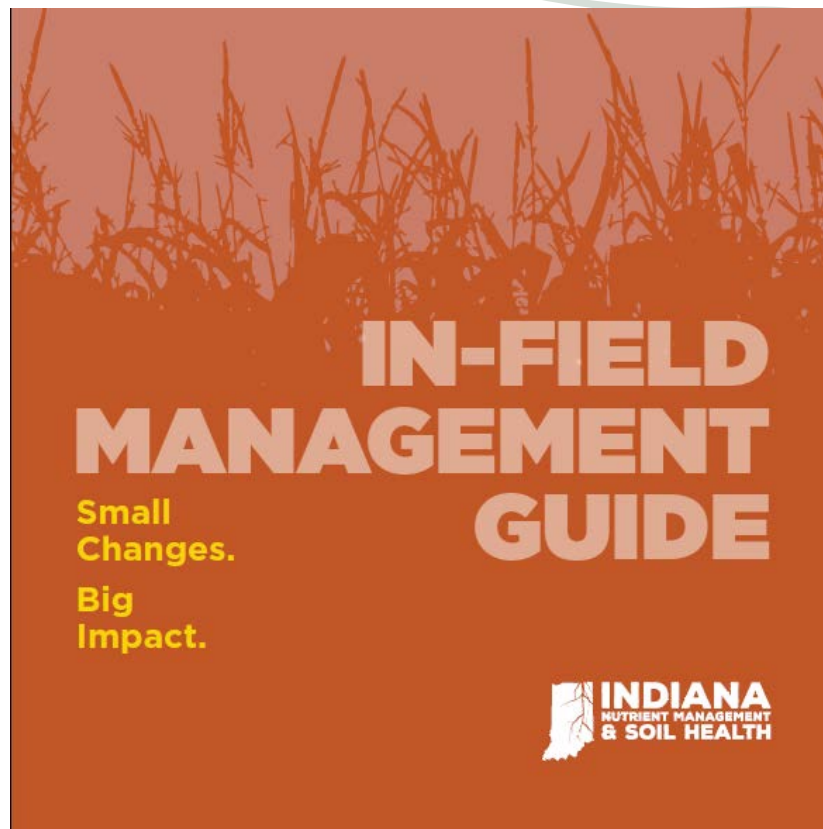
- Applicator Certification
- Fertilizer Application
- Manure/Litter Staging

Voluntary Initiatives

- 4R Nutrient Stewardship
- Soil Health Improvements
- Green Infrastructure

How to Educate

- Consistent Message
- Resources
- Outreach/Communication



In-Field Practices

1 PERFORMING SOIL SAMPLING

In order to determine the correct rate of nutrients to be applied for crops, a soil analysis is needed. Conducting regular soil tests for pH, phosphorus and potassium will determine the appropriate rate for lime, fertilizer and manure application.

Key considerations

- Soil testing should be conducted at a minimum of once every four years²
- Soil sampling results should drive fertilizer application decisions

76 %
of farmers
perform regular
soil sampling¹

2 DEVELOPING A NUTRIENT MANAGEMENT PLAN³

A nutrient management plan includes utilizing soil testing and nutrient applications wisely use nutrients only where needed. Nutrient use efficiency is maximum at the lowest rate applied. Rates recommended are designed to maintain the lowest non-limiting nitrogen (N) and phosphorus (P) level in the soil. N rates are designed to result in the highest profit over multiple growing seasons.

Key considerations

- When developing a nutrient management plan, it is important to remember the 4R's:⁴

Right Source: Match fertilizer type to crop needs

Right Time: Make nutrients available when crops need them

Right Rate: Match amount of fertilizer to crop needs

Right Place: Keep nutrients where crops can use them

27%
of farmers

implement nutrient management plans (manure, nitrogen and phosphorus)¹

- Plan should be based on realistic crop yield goals, soil tests to determine the nutrients available in fields, and taking credit for nutrients from legumes and manure applications
- Nutrient management plans should be a living document. Changes should be made as soil and crops' needs change from season to season or within a season



3 ADJUSTING TIMING OF APPLICATION

Timing of application influences availability and potential movement of nutrients. Nitrogen (N) should be applied as close as possible to the period of crop uptake — minimizing loss of N from the field and ensuring adequate N is available to the crop during critical growth periods.

Key considerations⁵

If at all possible, avoid fall application due to high risk of loss likely to occur between application and crop uptake, which may lower crop yields and recovery of applied nitrogen (N).

Application of fertilizer and manure on frozen or snow-covered ground should be avoided.

ESSENTIAL, BUT INDIVIDUAL

Making proven nutrient management choices today protects tomorrow.

By proactively making incremental changes, Indiana's farmers are leaders in protecting our state's resources while reducing the likelihood of "one size fits all" regulation.



4 OPTIMIZING NUTRIENT APPLICATIONS

Application and placement of fertilizer and/or manure should overlap as closely as possible to the period of maximum crop uptake.

Key considerations

- Consider the form of nitrogen (**Right Source**) being applied and its risk of loss
- Split nitrogen applications can reduce input costs and prevent over-application

RIGHT SOURCE:

Account for *all* sources of nutrients in recommendations⁴



5 REDUCING TILLAGE

Develop a system that reduces passes, depth, speed and/or aggressiveness of actions in the field to disturb soil as little as possible.

Key considerations


- Avoiding deep tillage can reduce soil erosion and is a critical component of preserving soil organic matter and structure by promoting soil health⁶
- Reducing tillage can reduce fuel use and labor costs, and will likely require incremental changes in equipment and management





6 UTILIZING IN-SEASON MANAGEMENT TECHNIQUES

Where appropriate, use imagery, tissue sampling, scouting and/or modeling to modify management systems based on site-specific data.



Key considerations

- Many factors contribute to the loss of nitrogen fertilizer including soil type, climate and agronomic practices.⁶ Modify your practices based on these factors for each field — allowing for the lowest optimum rate and most effective placement and timing of fertilizer application.⁷
- Remember:
The **right** fertilizer **source** at the **right rate**, at the **right time** and in the **right place**.⁴

PROTECTING TOMORROW'S BOTTOM LINE

Improving soil health and water quality by implementing essential personalized best management practices preserves Indiana's natural resources today and for agriculture's next generation.



7 ADOPTING COVER CROPS

Cover crops build soil organic matter, protect soil erosion, cycle nutrients, reduce compaction, sequester carbon from the atmosphere, build overall soil health and make it more resilient to weather extremes.⁷

Key considerations⁵

- Select the right species for the management practice being addressed
- Establishment and termination management

15% of farmers **planted cover crops in the last five years¹ (Prokopy)**



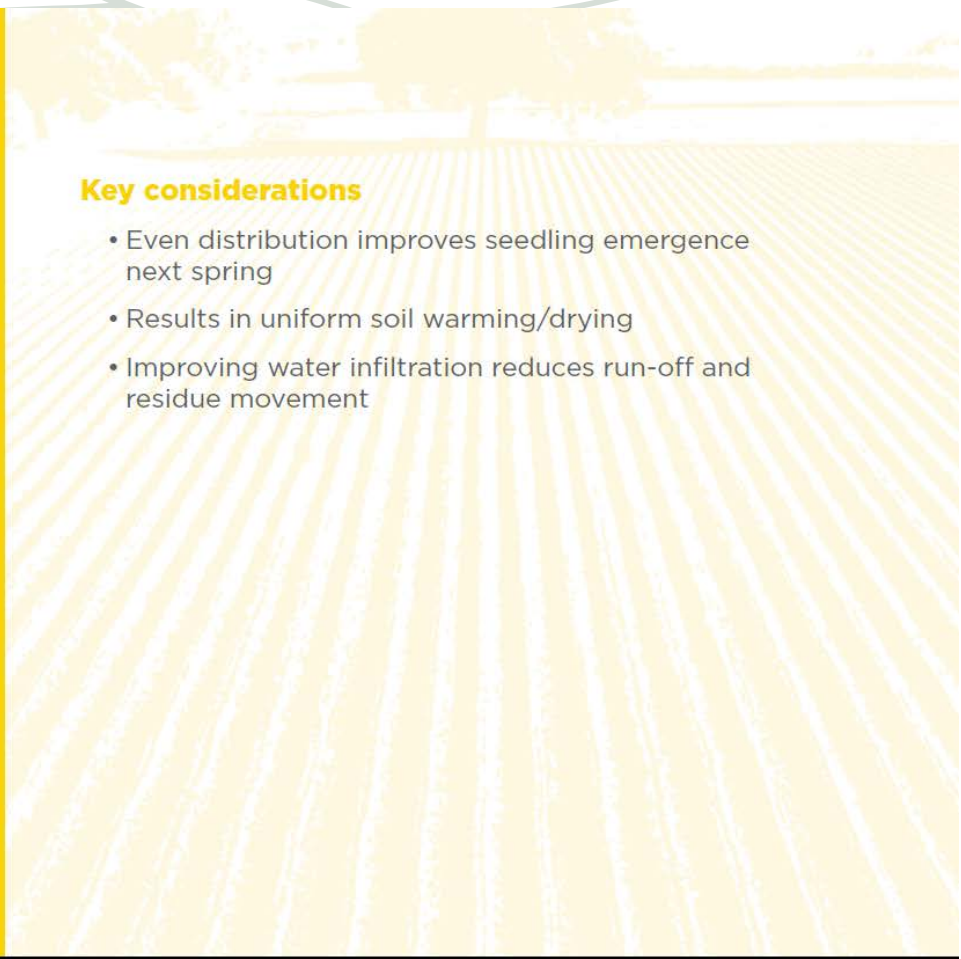


8 MANAGING CROP RESIDUE (FODDER)

Spread crop residue evenly on soil surface across whole combine pass to decrease all forms of soil erosion.

Key considerations

- Even distribution improves seedling emergence next spring
- Results in uniform soil warming/drying
- Improving water infiltration reduces run-off and residue movement



Edge-of Field Practices

- Managing Drainage Water
- Utilizing Buffer/Filter Strips
- Installing Grassed Waterways

Edge of Field Practices

- Incorporating Saturated Buffers
- Installing Bioreactors
- Forming Two-Stage Ditches
- Restoring Wetlands
- Building Riparian Buffers

IMPLEMENTATION



CCA Role and Responsibility

- Observe farmer/farm needs
- Encourage new practices
- Advise beyond N & P application
 - Use access to educate and encourage
 - Create linkage to green infrastructure assistance
- Create new partnerships
 - For you
 - For farmers

THANK YOU

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