IN-FIELD MANAGEMENT GUIDE

Small Changes.

Big Impact.

INDIANA
NUTRIENT MANAGEMENT
& SOIL HEALTH

Take the small steps needed today to protect Indiana's natural resources and your bottom line for the right reason — leaving the land better than you found it for the next generation to live, work and prosper on the farm.

OUR QUICK GUIDE

Nutrient management and soil health can be complicated subjects, but they don't have to be issues in your fields. This guide outlines eight best management practices (BMPs) to better manage nutrients and overall soil health.

Evaluate these BMPs and decide which mix is best for your farming operation — both agronomical and economical. Want more information? We've provided a list of organizations and businesses eager to help (see Resources on pages 20-21).

AG SOLUTIONS — LED BY AG

The Nutrient Management and Soil Health (NMSH) strategy was created to improve education and awareness of best management practices. Because farmers are in the best position to determine the practices that are most appropriate on their own farms to achieve reductions in nutrient loss, the NMSH strategy will increase on-farm awareness which will lead to improved nutrient management and soil health and, ultimately, Indiana's water quality.

This comprehensive strategy will stretch across multiple years with three main goals:

1. Increase awareness among farmers that nutrient loss from soil to water is an issue and can be managed at the farm level
2. Empower farmers to review and adopt new best management practices
3. Keep best management decisions in the hands of farmers

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 years[1]
- Soil sampling results should drive fertilizer application decisions

2 DEVELOPING A NUTRIENT MANAGEMENT PLAN[3]

A nutrient management plan includes utilizing soil testing and applying nutrients only where needed. 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)[2]

- Plan should be based on realistic crop yield goals, soil tests and if applicable, manure applications. Make certain that the plan credits the analyzed nutrient content of the manure applied
- Nutrient management plans should be a living document. Changes should be made as soil and crop 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 considerations[5]

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

Application of fertilizer and manure on frozen, snow or ice-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 take into account the source being used. Different fertilizer and/or manure sources may have either lower or higher analyses of fertilizer and must be accounted for in order to best manage for the next crop.

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 recommendations[4]

5 REDUCING TILLAGE

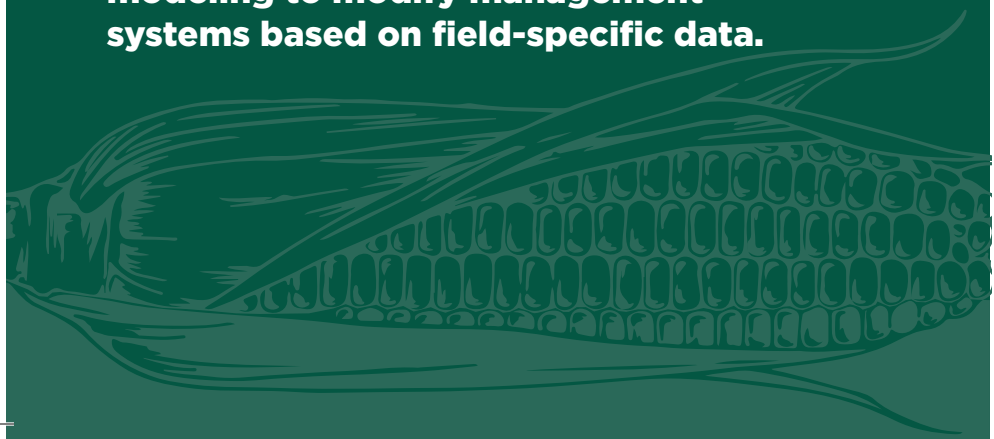
Develop a system that reduces passes, depth, speed and/or aggressiveness of actions in the field to disturb soil as little as possible.

Key considerations

- Avoiding deep tillage can reduce soil erosion and is a critical component of preserving soil organic matter and structure by promoting soil health[6]
- Reducing tillage can reduce fuel use and labor costs
- This practice will likely require incremental changes in equipment lines and management to fully implement

6 UTILIZING IN-SEASON MANAGEMENT TECHNIQUES

Where appropriate, use imagery, tissue sampling, scouting and/or proven modeling to modify management systems based on field-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 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 against soil erosion, cycle and capture nutrients, reduce compaction, sequester carbon from the atmosphere, build overall soil health and make it more resilient to weather extremes.[7]

Key considerations[5]

- Select the right species for the management practice being addressed (e.g., soil health, weed control, compaction, etc.)
- Establishment: Species, time of year at planting, and herbicides used that year all must be considered
- Management: Planning for termination and for planting into heavier residue are imperative
- This practice will likely require incremental changes in management to fully implement

15%
of farmers

planted cover crops in the last five years[2]

8 MANAGING CROP RESIDUE (FODDER)

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

Key considerations

- Results in uniform soil warming and drying
- Improves seedling emergence after planting
- Improves water infiltration to reduce run-off and residue movement

RESOURCES

Contact your local organization or business to gain more insights into these BMPs.

- **Certified Crop Advisers (CCAs)**
  - Find a CCA at: https://www.certifiedcropadviser.org/certifications/professional-search/
- **Purdue Extension**
  - Contact your local extension office: https://extension.purdue.edu/Pages/countyoffices.aspx
- **USDA Natural Resources Conservation Service (NRCS)**
  - https://www.nrcs.usda.gov/wps/portal/nrcs/site/in/home/

- **Indiana State Department of Agriculture (ISDA)**
  - www.in.gov/isda/
- **Soil and Water Conservation District (SWCD)**
  - www.iaswcd.org
- **Fertilizer retailers**
- **Equipment dealers**
- **Peer network / other farmers**
  - INfield Advantage: www.INfieldAdvantage.org
  - Conservation Cropping Systems Initiative: www.ccsin.iaswcd.org
  - Soil Health Partnership: www.soilhealthpartnership.org

THE NMSH PARTNERSHIP

Representing key organizations in the private and public sectors, this collaborative effort showcases the desire of farmers to address concerns in a way that makes sense and positions Indiana as a leader in resource management and protection.

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

PURDUE EXTENSION | LOCAL FACES COUNTLESS CONNECTIONS

Indiana Farm Bureau

INDIANA DAIRY PRODUCERS

ARP | AGRICULTURAL RESEARCH AT PURDUE

CERTIFIED CROP ADVISER

The Nutrient Management and Soil Health strategy is a proactive, ag-led educational effort that encourages metrics-driven research and personalized best management practices.

This partnership works towards reducing the likelihood of "one size fits all" regulation by optimizing nutrient use and soil health to ultimately improve water quality while supporting production and economic viability.

Learn more at **www.impactindiana.com**.

[1]Natural Resources Conservation Service. October 2013. "Conservation Practice Standard, Nutrient Management, Code 590." Accessed January 2017. Retrieved from: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1192371.pdf

[2]Stalker 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.

[3]Office of the Indiana State Chemist. Accessed January 2017. Retrieved from: http://oisc.purdue.edu/

[4]The Fertilizer Institute, 4R Nutrient Stewardship. "A Pocket Guide to 4R Nutrient Stewardship." Accessed January 2017. Retrieved from: http://www.nutrientstewardship.org/pdf-viewer/438-4r-pocket-guide

[5]Johnson, J.W., D.B. Mengel and M.I. Vitosh. July 1995. "Tri-State Fertilizer Recommendations for Corn, Soybeans, Wheat and Alfalfa." Michigan State University, The Ohio State University and Purdue University.

[6]Nielsen, R.L. 2006. "N Loss Mechanisms and Nitrogen Use Efficiency." Accessed January 2017. Retrieved from: https://www.agry.purdue.edu/ext/pubs/2006NLossMechanisms.pdf

[7]Camberato, J. and R.L. Nielsen. 2016. "Nitrogen Management Guidelines for Corn in Indiana." Accessed January 2017. Retrieved from: https://www.agry.purdue.edu/ext/corn/news/timeless/NitrogenMgmt.pdf

[8]Indiana State Department of Agriculture. "Cover Crop and Tillage Transect Data." Accessed January 2017. Retrieved from: http://www.in.gov/isda/2383.htm

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