Science Team
Practice Evaluation Results

Prepared for the NLRS Policy Working Group

NLRS Annual Conference, January 25, 2024

Lowell Gentry, University of Illinois

ILLINOIS
NUTRIENT LOSS
REDUCTION STRATEGY

NLRS Science Team

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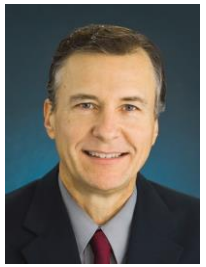

Lowell Gentry
Natural Resources & Environmental Sciences

Bin Peng
Institute for Sustainability, Energy, and Environment

Andrew Margenot
Crop Sciences

Maria Villamil's replacement
Department?

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NLRS Science Team

Proposed Practice Decisions

2023 Submissions

Drainage Water Management

Not Included

More research results requested

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Evaluation Discussion

Nitrate Removal Mechanism

- Load reduction due to decreased drainage volume, not by altering nitrate concentration.
- Tile water temperatures limit microbial activity and denitrification.

Fate of Retained Water

- Studies often overlook the fate of water lost via surface runoff and groundwater recharge.

Lateral Seepage Impact

- Retained water may seep into neighboring systems without reducing nitrate concentration.

Precipitation's Impact

- Nitrate-N load reduction linked to drain flow reduction.
- Effectiveness diminishes with increased precipitation.

Suitable Site

- Flat fields (<1% slope)
- Dredge ditches act as large tiles and have coarse material at 40-inch depths.
- Water control structures may be installed too close to dredged ditches.

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Research Discussion

Data Gaps from Illinois

- Notable lack of comprehensive Illinois data to confirm specific nitrate removal rates.

Small Plot Research Limitations

- May not accurately reflect real-world conditions, particularly concerning lateral seepage.

Need for Real-world On-farm Studies

- Studies need to be conducted on production fields with real world challenges.

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Recommendations for Future Studies

- Concentrate on creating comprehensive water and nutrient budgets (nitrogen and phosphorus).
- Essential focus: Thoroughly examine and quantify lateral seepage.
- Objective: Determine the fate of all water and overall efficacy of DWM.

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Proposed changes to Practice Proposal Guidance Update

New email address (NLRS@illinois.edu)

Updated language in reference to:

- NRCS Conservation Practice Standard
- Provision of supporting research results
- Peer-reviewed studies

https://epa.illinois.gov/content/dam/soi/en/web/epa/topics/water-quality/watershed-management/excess-nutrients/documents/nlrs-practice-approval-process_final_11102023.pdf

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Nutrient Loss Reduction Strategy

Process for updating existing practices or adding new practices to the Illinois Nutrient Loss Reduction Strategy

Updated November 2023

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Proposal Submission Process

Submit full proposals to NLRS@illinois.edu.

Please submit one practice per proposal. Organizations may submit more than one proposal.

Annual Cycle

For full consideration, proposals should be submitted by July 31 annually. However, proposals may be submitted at any time during the year, and they will be collated and reviewed together in the fall annually.

Proposals submitted on a timely basis initially will be reviewed by the Illinois NLRS Steering Committee to determine if the package is complete, upon which the proposal will be forwarded to the Illinois NLRS Science Team for review. The science team will develop a consensus as to either recommend the practice or not to recommend the practice. On successful review, the science team will make recommendations to the Illinois NLRS Policy Working Group, and final recommendations will be included in the following biennial report.

Proposal format

1. **Background.**
    a. Provide details about the practice, how it reduces nutrient loss, and landscapes for which the practice is appropriate (i.e. tile drained, highly erodible, etc.). If the USDA NRCS National Conservation Practice Standard is available, then it is required as an attachment to the proposal.
    b. Discuss the effectiveness of the practice and its level of certainty (low, medium, high) with appropriate justification.
    c. Discuss how research results were obtained and the representativeness of study conditions. It is the applicant's responsibility to justify the robustness of results in terms of research methods, comprehensiveness of data, number of site-years, climate conditions, etc.

NRCS Conservation Practice standard included when available

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2. Results. Provide a summary table (hereafter Table 1) of studies documenting effectiveness of the practice along with the % N and/or % P loss reduction value (or range of values) from each study. **The studies themselves must also be included as attachments for review.** The pdf or readily accessible pdf link is necessary to properly review the proposal.

Include pdf of all studies in Table 1.

Hyperlink Protocol

If a study is hyperlinked within the table of the proposal, it is mandatory to also provide that study in a PDF or Word document format. This document can be: 1) directly attached to the proposal, or 2) stored in a shared drive link that accompanies the proposal submission.

Highlighting or Annotating Relevant Data

Applicants should highlight or annotate the relevant data within each study from which the %N or % P loss reduction value originated. This can be done by:

- Annotating the PDF directly, or
- Placing a comment in the main document to guide the evaluators to the evidence that supports the % removal efficiencies proposed.

Annotate the relevant data in each study.

Numeric Data Provision for Table 1 Citations

Some studies might not give exact numbers for their figures or images, which can challenge evaluation by the committee. For any figure or image in a study that is referenced in Table 1:

- If numeric values of data points in cited figures or images are unclear, missing, or not readily usable, then those data will not be considered when the team is assessing the proposal's merits and validity. In other words, only clear and usable numeric values of datapoints will be considered in the review process.
- All effort should be made to provide the exact numbers from the referenced graphics.
- Include uncertainty values if these are reported (e.g., standard error, standard deviation, or other measures of variability or uncertainty).
- These data can be sourced by emailing the corresponding author(s) or using data extraction tools such as plotdigitizer.com.
- Consolidate these data in a summary table that synthesizes data from across tables/figures or other parts of the study

Provision of numeric data.

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Removed the phrase "gold standard"

Criteria for proposal evaluation

- Peer-reviewed studies are preferred and will be given the highest priority in the evaluation, as peer review provides a minimum level of quality assurance.
- Gray literature (conference proceedings, white papers, trade reports) may be considered on a case- by-case basis. In the proposal, it should be discussed why results were not published in a scientific journal.
- Field-scale studies are the expected research method. However, the science team will assess on a case-by-case basis whether laboratory or modeling studies are appropriate to include.
- Studies should be performed in Illinois, near Illinois, or where the case can be made that the biophysical conditions where the study was performed are representative of Illinois.
- Priority will be given to cases where there have been more studies performed on a given practice (ideally by different research groups), and where there are more site-years documenting practice performance.
- If the USDA NRCS National Conservation Practice Standard is available, then it is required as an attachment to the proposal.

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Questions?

The NLRS Ag Water Quality Science Team can be reached at NLRS@illinois.edu

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