Best Management Practices for Agram, Belle Prairie, and Ripley Townships in Morrison County, Minnesota

Approved: December 2024

This document is a list of the University of Minnesota nitrogen (N) fertilizer best management practices (BMPs) that apply within Agram, Belle Prairie, and Ripley Townships in Morrison County. The BMPs are from the following University of Minnesota resources:

- Best Management Practices for Nitrogen on Coarse Textured Soils,
- Best Management Practices for Nitrogen Use in South-Central Minnesota,
- Best Management Practices for Irrigated Potatoes,
- Fertilizing Corn in Minnesota, and
- University of Minnesota Extension webpage Crop-Specific Nutrient Needs (https://extension.umn.edu/nutrient-management/crop-specific-needs)

Considerations when reading the BMP tables

- The BMPs listed below are either applicable to all soils or specific to coarse or fine textured soils. There are both coarse and fine textured soils across the cropland within Agram, Belle Prairie, and Ripley townships. An interactive map that shows where the soils are classified as coarse within these townships is available on the Agram, Belle Prairie, and Ripley Townships webpage (www.mda.state.mn.us/agram-belleprairie-ripley-twps).
- In situations where a field is operated with the same crop management and has areas with both coarse and fine textured soils, the operator can either manage these areas of the field separately or follow the BMPs for the majority soil texture within the field.
- Some BMPs may not apply to all cropping systems, such as, incorporation of urea with tillage in no-till systems. If a BMP is agronomically or technically unsuitable for a specific field based on soil type, topography, crop or management system, a suitable BMP or Alternative Management Tool (AMT) can be selected in its place.
- See the companion document "Definitions of Terms in the University of Minnesota Nitrogen Fertilizer BMPs" for definitions of terms related to the BMPs. This document is available on the Agram, Belle Prairie, and Ripley Townships webpage (www.mda.state.mn.us/agram-belleprairie-ripley-twps).

A strategy for protecting groundwater within townships

- The local advisory team will meet as needed to review practice adoption, related monitoring data, and to consider establishment of additional or innovative practices as these opportunities become available.
- The primary goal of the Nitrogen Fertilizer Management Plan is to involve the agricultural community in problem solving at the local level to address localized concerns about elevated levels of nitrate in groundwater. Active participation and demonstrated outcomes are critical to supporting this voluntary approach. At a township scale, an increase in the adoption of the listed BMPs and AMTs will protect groundwater. Even small improvements in nitrogen management across a large area can reduce nitrogen loss below cropland and over time reduce nitrate levels in groundwater.
- The nitrogen fertilizer BMPs and AMTs listed below provide a list of practices that are appropriate for the cropland within these townships. In areas with vulnerable groundwater, AMTs tend to be most protective of groundwater. The MDA is publishing this list of practices after having gathered input from local agriculture stakeholders who make fertilizer use decisions within this area. The MDA will seek opportunities for increased outreach and adoption of both BMPs and AMTs in this area.

Questions or Comments?

Ryan Perish | MDA Local Project Lead | Ryan.Perish@state.mn.us | 218-898-0002

Best Management Practices (BMPs)

The BMPs numbered 1 – 3 apply to all soil types and are the most important BMPs to reduce nitrate leaching losses.

BMP	Rate BMPs for All Soil Types	Applies to
1	Corn nitrogen rates are based on the nitrogen fertilizer application guidelines from the University of Minnesota[1]. Rates were last updated July 2023. **Dryland corn following corn**: up to the high end of the 0.10 nitrogen rate range (currently up to 190 lbs. N/ac)[2] **Dryland corn following soybean:** up to the high end of the 0.10 nitrogen rate range (currently up to 150 lbs. N/ac)[2] **Irrigated corn following corn:** up to the high end of the 0.10 nitrogen rate range (currently up to 225 lbs. N/ac)[2] **Irrigated corn following soybean:** up to the high end of the 0.10 nitrogen rate range (currently up to 195 lbs. N/ac)[2] For other crops grown in the area, appropriate nitrogen rates follow the current University of Minnesota guidance applicable to that crop[2]	All agronomic crops[3] on all soils
2	Include N supplied in a starter, weed and feed program, and contributions from phosphorus fertilizers such as MAP and DAP when calculating total N rate[4]	All agronomic crops[3] on all soils
3	Take appropriate N credit for previous legume crops and manure used in the crop rotation[5]	All agronomic crops[3] on all soils

[1] Corn nitrogen rate guidelines from the University of Minnesota, Fertilizing corn in Minnesota (https://extension.umn.edu/crop-specific-needs/fertilizing-corn-minnesota), or its successor.
[2] The implementation of approved alternative management tools may allow a higher nitrogen rate provided that the field specific data indicates this is appropriate.
[3] All crops listed at the University of Minnesota Extension webpage Crop-Specific Nutrient Needs (https://extension.umn.edu/nutrient-management/crop-specific-needs) or its successor.
[4] Total N rate should also include any AMS or other inorganic fertilizers containing nitrogen.
[5] In addition to legumes and manure, total N rate should also include nitrogen from organic sources with a known nitrogen availability factor (i.e. research-based nitrogen availability table or laboratory analysis, including first and second year credits) such as biosolids and industrial by-products.

BMP	Placement, Timing and Source BMPs for Coarse Textured Soil Types	Applies to
4	Use split applications of nitrogen fertilizer	Corn and edible beans on coarse textured soils

BMP	Placement, Timing and Source BMPs for Fine Textured Soil Types	Applies to
5	Use split applications of ammonia, urea, and UAN	Corn on fine textured soils

The BMPs for **Irrigated Potatoes** are listed in the tables below.

BMP	Rate BMPs for irrigated potatoes only	Applies to
6	Base nitrogen rate on variety, harvest date, and realistic yield goals[6]	Irrigated potatoes
7	Account for nitrogen from previous crop (take N credits from legumes)	Irrigated potatoes
8	Test irrigation water for nitrogen content and adjust fertilizer accordingly	Irrigated potatoes

BMP	Timing BMPs for irrigated potatoes only	Applies to
9	Do not use more than 40 lbs. N/ac in the starter for mid/late season varieties[7]	Irrigated potatoes
10	Do not use more than 60 lbs. N/ac in the starter for early harvested varieties[7]	Irrigated potatoes
11	Nitrogen applied through the hilling stage should be cultivated/incorporated into the hill	Irrigated potatoes
12	Plan the majority of soluble N inputs from 10 to 50 days after emergence	Irrigated potatoes
13	Use a petiole analysis to aid in making post-hilling nitrogen applications	Irrigated potatoes

BMP	Source BMPs for irrigated potatoes only	Applies to
14	For mid to late season varieties[7], apply ESN no later than emergence	Irrigated potatoes
15	ESN for early harvested potatoes is not recommended due to slow release of N	Irrigated potatoes

BMP	Other BMPs for irrigated potatoes only	Applies to
16	Follow proven water management strategies (irrigation scheduling) to provide effective irrigation and minimize leaching	Irrigated potatoes
17	Establish a cover crop following potatoes whenever possible[8]	Irrigated potatoes

[6] Yield refers to total yield, not harvestable yield.

[7] Early = vines killed or green dug before August 1; Mid = vines killed or green dug August 1-August 31; Late = vines killed or green dug after September 1.

[8] Establish a cover crop following potatoes harvested before September 1. Potatoes harvested on or after this date need a cover crop established unless the soil is too wet for seeding, weather is too cold or it is too late in the growing season for cover crop growth. These and other reasons for not planting cover crops will be considered on a case-by-case basis.

Alternative Management Tools (AMTs) and Additional Practices

In areas where the groundwater is vulnerable to nitrate contamination, following nitrogen fertilizer best management practices (BMPs) alone may not be enough to reduce the amount of nitrate leaching into groundwater to meet water quality goals. The MDA encourages farmers to consider practices and activities that go beyond traditional nitrogen fertilizer BMPs and to adopt AMTs that provide additional protection from the loss of nitrogen below cropland.

The following is a list of AMTs that are currently approved by the MDA and have been reviewed with the local advisory team (LAT). The LAT acknowledges the protective potential of these practices. While BMPs are widely applicable, AMTs can be appropriate when it is practicable for an individual producer or specific field.

- Minnesota Ag Water Quality Certification Program (MAWQCP)
- Land Conservation Programs
- Increasing Continuous Cover: Perennial Vegetation

- Increasing Continuous Cover: Cover Crops
- On Farm Nitrogen Rate Trials
- Precision Nitrogen Management
- Intermediate Wheatgrass (Kernza)

Additional alternatives acknowledged by the local advisory team as protective of groundwater include the following. While these listed practices are not currently approved AMTs, when compared with typical crop rotations, these are practices that could be protective of groundwater.

- Including perennial crops such as alfalfa in crop rotations.
- Growing crops with low nitrogen needs such as small grains and soybeans.

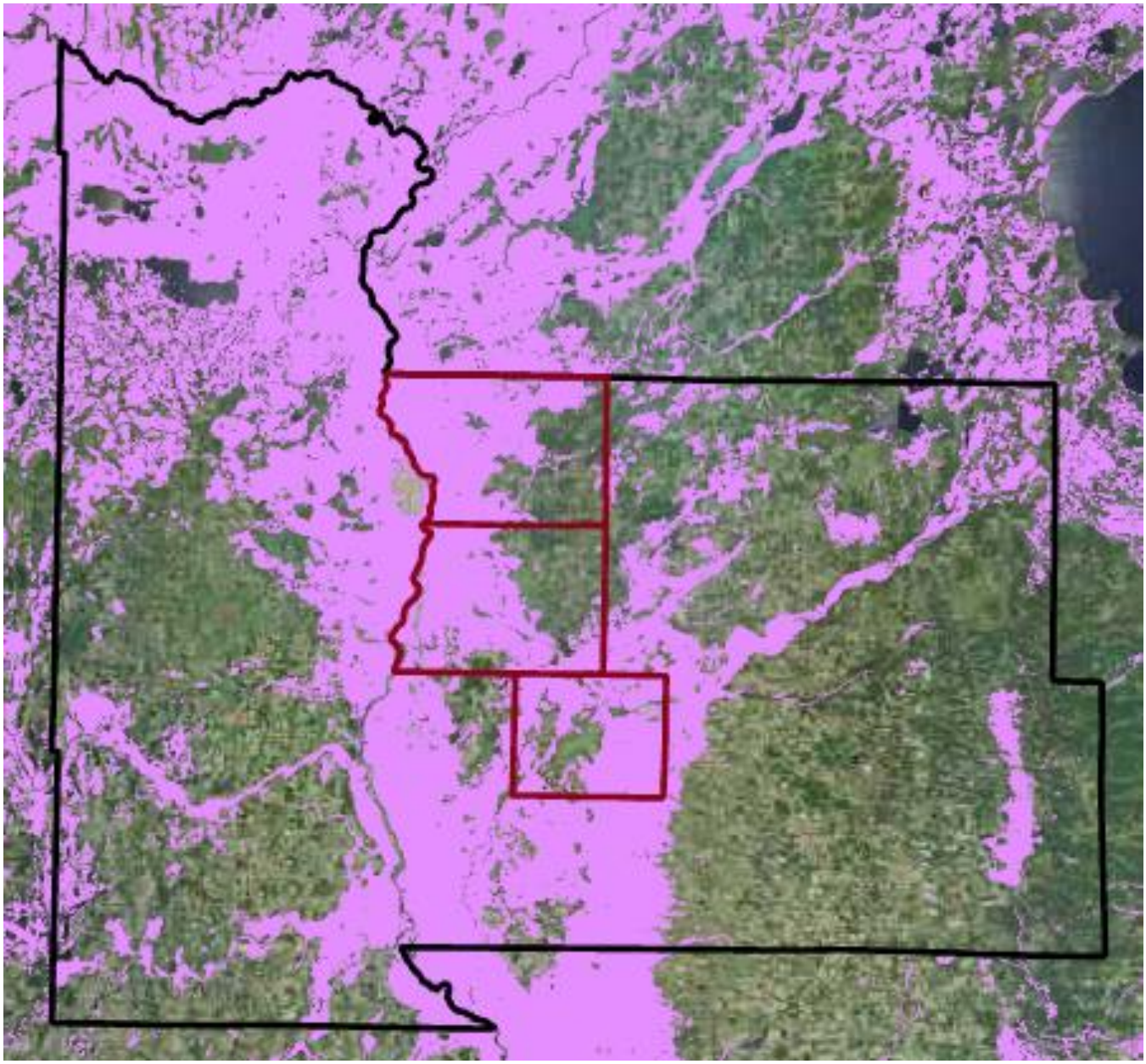
Below is a list of additional practices that could be protective of groundwater or provides information to guide the use of nitrogen fertilizer. Some may not be appropriate or applicable to every farm. Maintaining records of nitrogen fertilizer use is an especially important practice to provide the ability to review the rate of adoption within these townships in the future.

- Keep records of nitrogen use, including rates, crediting of nitrogen sources, timing, placement, and source.
- Attend educational activities approved by the MDA.
- Field testing to determine nitrogen requirements for specific crops.
- Test manure using a lab approved or certified by the MDA.
- Test as needed to monitor nitrate-nitrogen concentrations in the groundwater.
- Schedule irrigation according to crop needs (evapotranspiration) and soil water holding capacity and apply only enough to fill the effective crop root zone to avoid leaching.
- Manage irrigation in a way that there is always some room left in the root zone for possible precipitation.

In addition to the items listed above, the MDA recognizes the prevalence of manure use on the cropland within these townships. Careful manure management is critical to make efficient use of this resource and avoid practices with inherently higher risk of nitrogen loss below the crop root zone. Careful crediting of nitrogen available from manure is fundamental. In addition to crediting, the promotion and support for manure testing, applicator calibration, and improvements to manure application equipment and storage facilities can all improve the crop utilization of nitrogen available from manure and reduce the amount of nitrogen available for loss below the crop root zone.

On irrigated acres within these townships the promotion and support for the use of tools and information to make irrigation water application timing decisions and system upgrades to improve irrigation water use efficiency could further reduce the risk of saturated soil conditions that are conducive to leaching. The irrigation technology regional conservations partnership program (RCPP) grant sponsored by the MDA is an example of the type of promotion and support to expand adoption of these tools to manage irrigation water more precisely. Visit Precision Irrigation Cost-Share for more information (www.mda.state.mn.us/precision-irrigation-cost-share).

Agram, Belle Prairie, and Ripley Townships in Morrison County



The Agram, Belle Prairie, and Ripley townships are outlined in red. The coarse textured soils in Morrison County are shaded in pink.