Overview of Nitrate Reduction Strategy Supporting the Groundwater Protection Rule in the Hastings DWSMA

June 2023

This is a summary of the nitrate reduction strategy in the Hastings Drinking Water Supply Management Area (DWSMA). The Minnesota Department of Agriculture (MDA) based the strategy on surveys with local crop retailers, input from local farmers and agronomists, years of University of Minnesota research on nitrogen fertilizer best management practices (BMPs), and robust computer modeling that simulates the physical and chemical processes that occur in soil under agricultural management. The four options below provide flexibility so farmers can decide the sets of practices that work best in their operations. The MDA is working with partners to secure funding to offset costs and support implementation.

1. Best Management Practices (BMPs) for the Hastings DWSMA

If farmers implement practices on the BMP list for the Hastings DWSMA, including the rates listed below, no additional practices are required. The BMP list includes following the 0.1 MRTN from the nitrogen fertilizer application guidelines from the University of Minnesota. All sources of nitrogen need to be credited when determining rate. This includes manure, legumes, and other sources of nitrogen. Source, timing, and placement BMPs also need to be followed. See the document *BMPs for the Hastings DWSMA* for more detail.

Crop	Total N Rate Limit (lbs. N/acre)[1]
Dryland Corn following Soybeans	140
Dryland Corn following Corn	175
Irrigated Corn following Soybeans	180
Irrigated Corn following Corn	210
Potatoes	250
Other crops	Rates provided on U of M Extension Website[2]

The alternatives below may allow for the application of higher nitrogen rates.

2. Alternative Management Tools allow higher rates on individual fields

Alternative Management Tools (AMTs) are specific agricultural practices and solutions, other than nitrogen fertilizer BMPs, to address groundwater nitrate problems. AMTs may substitute for one or more of the BMPs required. In some cases, these practices allow higher rates of nitrogen on individual fields. More information is available at: www.mda.state.mn.us/chemicals/fertilizers/nutrient-mgmt/nitrogenplan/nitrogenmgmt/amts.

Approved AMTs include:

- Increasing Continuous Cover: Cover Crops
- On-Farm Nitrogen Rate Trials
- Precision Agriculture: Precision Nitrogen Management
- Retiring Cropland: Land Conservation (Set Aside) Programs
- Intermediate Wheatgrass (Kernza)

Farmer proposed AMTs: The MDA encourages stakeholders to suggest new AMTs to reduce or mitigate loss of nitrate from crop production to groundwater. The MDA has instructions at: www.mda.state.mn.us/pesticide-fertilizer/amt-review-process. Upon review of AMTs, the MDA will approve, approve with condition, or reject the proposed AMT.

3. Adoption of vegetative cover that allows higher nitrogen rates

Higher nitrogen rates can be applied to corn combined with the use of in-season applications, cover crops and perennial vegetation. The Hastings DWSMA Nitrogen Rate, Cover Crop, and Perennial AMT provides details on the rates, number of in-season applications, and the percentages of cropland in cover crops and perennial vegetation. The higher rates can be applied on a farm operation's corn acres in the DWSMA. See the document *Hastings Drinking Water Supply Management Area Nitrogen Rate, Cover Crop, and Perennial AMT* for more detail.

This table provides *examples* of nitrogen rates combined with in-season nitrogen applications and the use of cover crops and/or perennial vegetation in this AMT. Each line provides an option for dryland or irrigated corn acres specifying the higher nitrogen rate, number of in-season N applications, and either cover crop or perennials as a percentage of the acres in the corn/soybean rotation needed per year to gain similar benefit in nitrate leaching reductions. If a farmer elects to use the table below and apply a higher rate, they are still expected to follow all other BMPs applicable to their operation.

Table 1. Hastings DWSMA Nitrogen Rate Cover Crop and Perennial AMT table

	N Rate Limit (lbs.-N/acre) Corn Following Soybean/Corn		In-season N application requirements		Cover Crop	Perennials
Option	Dryland	Irrigated	Fine-Textured Soils	Coarse-Textured Soils†	% Acres Per Year‡	% Acres Per Year‡
1	150 / 190	195 / 225	0	1	17%	0%
2	150 / 190	195 / 225	0	1	0%	10%
3	150 / 190	195 / 225	1	1	16%	0%
4	150 / 190	195 / 225	1	1	0%	9%
5	150 / 190	195 / 225	1	2	14%	0%
6	150 / 190	195 / 225	1	2	0%	8%
7	150 / 190	205 / 235	0	1	21%	0%
8	150 / 190	205 / 235	0	1	0%	12%
9	150 / 190	205 / 235	1	1	20%	0%
10	150 / 190	205 / 235	1	1	0%	11%
11	150 / 190	205 / 235	1	2	19%	0%
12	150 / 190	205 / 235	1	2	0%	10%

† A preplant N application of a polymer-coated urea fertilizer (ESN) can substitute for a one in-season application on coarse-textured soils

‡ Acres required are based on a farms total corn/soybean acres multiplied by the percent acres per year

4. Minnesota Ag Water Quality Certified Farm

Farmers that are certified through the Minnesota Ag Water Quality Certification Program (MAWQCP) are deemed to be in compliance with any new water quality rules or laws during the period of certification. The MAWQCP provides rigorous criteria for certification which is at least as protective as the practices promoted through Groundwater Protection Rule.

Contact

Farmers and agronomists with questions can contact Travis Hirman at the MDA for additional information.

Travis Hirman | MDA Local Project Lead | Travis.Hirman@state.mn.us | 612-201-4194

---

[1] Rates for corn are based on the U of M's guidelines for the Maximum Return to Nitrogen (MRTN) at the 0.1 N price / Crop value ratio. Guidelines were last updated for corn in 2022.

[2] All crops listed at the University of Minnesota Extension webpage Crop-Specific Nutrient Needs at https://extension.umn.edu/nutrient-management/crop-specific-needs or its successor.