

SPRING NITROGEN APPLICATION OPTIONS



N = Nitrogen P = Phosphorous

1 PRE-PLANT BANDING

ADVANTAGES

- Efficient under western Canadian conditions
- Protects N from loss via volatilization, immobilization, and denitrification
- When done with cultivator, this same trip can help manage ruts left from harvest
- Low disturbance disk seeders may be able to preplant band (or even post plant band) fertilizer with minimal seedbed disturbance

PROCEED WITH CAUTION

- Bands shouldn't be disturbed by tillage or seeding
- Anhydrous should be placed at least 4" below soil surface and urea should be banded as deep as possible for seed safety
- Can delay seeding
- May impair germination if seedbed dries out or if clods are formed
- Apply perpendicular to direction of seeding canola and wheat to reduce stand thinning
- If all P is placed within a high rate band of N, early season P access may be reduced, so consider some seedplaced P

2 SURFACE APPLICATION IMMEDIATELY BEFORE OR AFTER SEEDING

ADVANTAGES

- Fast fertilizer application method
- Efficient with regular rainfall
- Dribble UAN application is more efficient than broadcast UAN or urea

PROCEED WITH CAUTION

- Can have high N loss from volatilization unless incorporated or a urease inhibitor is used
- Surface stranding an issue in dry soil
- Loss due to immobilization by crop residue

3 BROADCAST AND INCORPORATED BEFORE SEEDING

ADVANTAGES

- Fast fertilizer application method
- Incorporation with tillage may also serve to manage ruts

PROCEED WITH CAUTION

- Harrowing or shallow tillage may be of insufficient depth to eliminate volatilization loss

4 PLACEMENT IN THE SEED-ROW

ADVANTAGES

- Eliminates an extra pass/expense
- Efficient in reducing N losses
- Wheat and barley are less sensitive to seedling damage

PROCEED WITH CAUTION

- Can result in seedling damage (salt and ammonia toxicity)
- May delay crop emergence and vigor
- Safe rates are insufficient to meet full crop N needs
- Use of polymer coated urea (ESN) improves seed safety, allowing up to 3x the N rate than that of urea

5 SIDE-BANDING OR MID-ROW BANDING AT SEEDING

ADVANTAGES

- Decreased risk of ammonia toxicity compared to seed-placing
- Entire N requirements of crop can often be met through side-band or mid-row banding

PROCEED WITH CAUTION

- Placement 1" to the side and 1" below may not be sufficient separation to ensure seed safety (prefer 2" from the seed row for solution or dry fertilizer and 2-3" for anhydrous ammonia)

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6 BANDING N IMMEDIATELY AFTER SEEDING

ADVANTAGES

- May have cost and efficiency advantages over top-dressing

PROCEED WITH CAUTION

- Limited research/information
- Low disturbance opener use encouraged to minimize destruction of the seed bed
- NH₃ must be injected to recommended depth to "minimize seeding damage"

7 POST EMERGENCE OR MID-SEASON APPLICATIONS

ADVANTAGES

- Useful if N application prior to seeding wasn't an option due to seedbed quality
- Able to wait and estimate crop yield potential
- Usually applied as a split option supplementing at seeding placements

PROCEED WITH CAUTION

- Same cautions as surface application (N losses)
- Application of UAN as a full-coverage spray may result in leaf burn and N loss
- Reliant on in-season precipitation to avoid stranding or volatilization
- Use of a urease inhibitor delays losses to volatilization

LEARN MORE

► Nitrogen Rate Calculator for Wheat, Barley and Canola

<https://www.gov.mb.ca/agriculture/crops/soil-fertility/pubs/nitrogencalculatorver1.0.xls>

► Wet Soils Influence Soil Fertility

<https://www.gov.mb.ca/agriculture/crops/soil-fertility/wet-soils-influence-soil-fertility.html>

► What Happens to Surface Applied N?

<https://www.gov.mb.ca/agriculture/crops/soil-fertility/what-is-happening-to-the-n.html>

► Revised N Fertilizer Guidelines for Wheat, Barley and Canola in Manitoba

<https://www.gov.mb.ca/agriculture/crops/soil-fertility/revised-nitrogen-fertilizer-guidelines-for-wheat-barley-and-canola-in-manitoba.html>

► Midseason N Application on Wet Soils

<https://www.gov.mb.ca/agriculture/crops/soil-fertility/midseason-n-application-on-wet-soils.html>

► Modifying N Rates for Delayed Seeding of Cereals and Canola

<https://www.gov.mb.ca/agriculture/crops/soil-fertility/modifying-nitrogen-rates-for-delayed-seeding-of-cereals-and-canola.html>

► Enhanced Efficiency Additives for Nitrogen- How they Work

<https://www.gov.mb.ca/agriculture/crops/soil-fertility/enhanced-efficiency-additives-for-nitrogen.html>

► Soil Fertility Guide

<https://www.gov.mb.ca/agriculture/crops/soil-fertility/soil-fertility-guide/index.html>

► Selecting the Right Source of Fertilizer N in Manitoba

https://umanitoba.ca/faculties/afs/ncl/pdf/GHG_BMP_N_SOURCE.pdf

DEFINITIONS

Volatilization

The loss of N to the atmosphere as ammonia gas. Conditions that lead to high volatilization loss potential include:

- High soil temperatures
- Moist soil conditions, followed by quick drying
- Windy conditions
- High soil pH
- High lime content in surface soil
- Coarse soil texture
- Low organic matter content
- High amounts of surface residue

Denitrification

The conversion of nitrate-N to gaseous forms of N, which can then be lost to the atmosphere. Conditions that lead to high rates of denitrification:

- Levels of oxygen in soil are limited (wet or flooded soils)
- Soil is compacted
- Soil temperatures are warm

Immobilization

The tie up of N in soil microorganisms as they decompose crop residues and use plant available N for their own growth and reproduction. This type of N loss is:

- Temporary; N will become available when microorganisms die and decompose
 - However, N availability in year of application will be limited
- Greatest for crop residues that have low concentrations of N or high C to N ratios (e.g. cereal crop residues)



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