

# Stretching Fertilizer Dollars and Supplies



November 2021

In fall 2021, Manitoba farmers experienced large fertilizer price increases and some periodic shortages of fertilizer. Farmers may wish to consider the following factors to ensure they are using fertilizers economically and efficiently – especially when soils remain dry and yield potential is questionable.

The 4R's of Nutrient Stewardship – the **right rate**, the **right source**, the **right time**, and the **right place** – can be used to direct such strategies.



## Right Rate

### Soil Test

Many areas of Manitoba experienced yield-limiting drought in 2021, which left much nitrogen unused in the soil. Soil nitrate-N levels may be two to three times higher than normal residual, and offer considerable savings on 2022 crop nitrogen needs. To ensure you are taking a proper inventory of this resource, sample the 0-6" and 6-24" depths. A single field composite should be comprised of 20 or more soil cores. If variability of nitrogen of yield potential is expected in the field, zone sampling and variable rate application may be warranted.

### Nitrogen Credits

Nitrogen needs may be fully or partially met by manure applications or previous legume or pulse crops.

- Manure nutrient credits are based on the type of manure and application rate. Book values of manure nutrient content are available at [www.gov.mb.ca/agriculture/environment/nutrient-management/pubs/properties-of-manure.pdf](http://www.gov.mb.ca/agriculture/environment/nutrient-management/pubs/properties-of-manure.pdf).
- Nitrogen may be available from terminated forage legumes or dry peas. The nitrogen credit from legume forages is as high as 90 lbs N/acre, depending on timing of termination and legume stand density. Nitrogen credits are small from most grain pulse crops, but dry peas can be considered to provide approximately 25 lbs N/acre.
- Green manure crops are not common, but for every 1,000 lbs of dry matter produced by a grain or forage legume, about 15 lbs N/acre is available the following year.
- Estimates of N release from soil organic matter have proven fruitless in Manitoba research, due to our unpredictable growing season moisture.

## Right Rate (continued)

### Crop Selection

Crops require different levels of nutrients, especially nitrogen. Large nitrogen consumers are canola, wheat, and corn. Modest consumers are oats, flax, and sunflowers. Pulse and legume crops, such as dry peas, soybeans, and dry beans, may have little to no need for supplemental nitrogen. Ideally, allocate those crops to fields according to soil nitrogen reserves.

### Crop Yield Potential

Carefully consider your intended crop yield potential. Lack of water reduced many yields in 2021, and if soil moisture reserves remain low, growers may wish to set conservative yield goals, which will directly impact required nitrogen rates (Figure 1). Nitrogen rates for other crops are often estimated from the lbs N required per bushel of expected yield. Use realistic numbers in setting such yield goals.

### High Fertilizer Costs

When high fertilizer costs are coupled with high crop prices, the temptation to slash fertilizer rates may be unfounded. Consider using the Nitrogen Rate Calculator

([www.gov.mb.ca/agriculture/crops/soil-fertility/nitrogen-rate-calculator.html](http://www.gov.mb.ca/agriculture/crops/soil-fertility/nitrogen-rate-calculator.html)) for wheat, barley, and canola, which maximizes returns based upon fertilizer cost, expected crop prices and soil test N.

## Right Source

- Select fertilizer sources that are effective and at minimum cost. Manure can be very economical since it is often priced on nitrogen content alone.
- Many enhanced-efficiency fertilizers and additives are available to minimize potential losses, but at additional cost. Recognize the type of loss they protect against (e.g., leaching, denitrification, or volatilization) and balance those risks with the additional cost. If soils remain dry, losses to leaching and denitrification are slight.

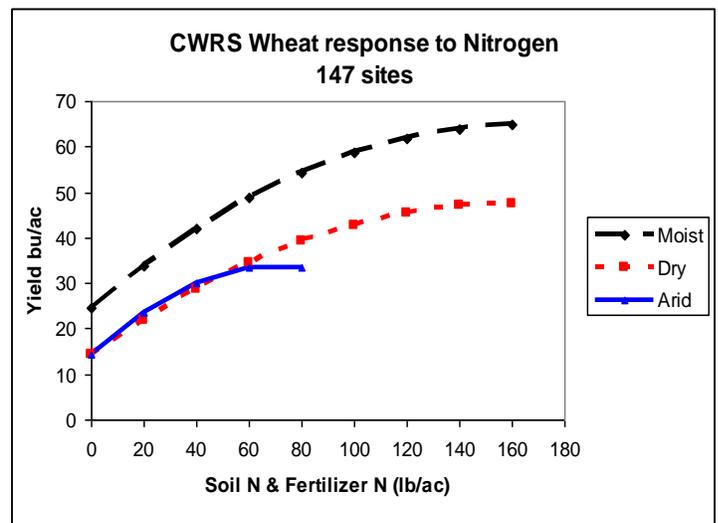


Figure 1. Wheat response to applied nitrogen under different moisture regimes.

### Financial Risk

The above calculator contains a function to account for financial risk. While returns are maximized with \$1 return back on the last \$1 of fertilizer, this can take a fair bit of fertilizer for that last bushel. If the financial risk of high rates appears excessive, consider changing your marginal return expectation, by setting it to a \$1.50 return for the last dollar spent on fertilizer.

### Weed Control

Control weeds early in crops. Weeds compete directly for nutrients at the expense of the crop – both in spring and with uncontrolled volunteer crop and weed regrowth in the fall.

- Evaluate sources based on the lbs. of nutrient (N<sub>2</sub>, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O) supplied. Lower cost, but diluted-formula fertilizer applications, may not meet crop needs and will ultimately deplete soil reserves.

## Right Time

- Nitrogen application before, or at, seeding has proven to be very efficient, on average.
- This method is 20% more efficient than fall applications of the same application method/placement.
- Recent studies have shown that split N applications have been effective for high yield and protein in spring wheat. So, if a conservative N rate is applied at seeding due to modest yield outlook, the remaining amount can be applied between stem elongation and flag leaf emergence, particularly if moisture conditions and yield potential improve.

## Right Source

In-soil banded fertilizer maximizes the efficiency of nitrogen, phosphorus, and potassium. Nitrogen efficiency is increased by about 20% by band placement over broadcasting. Phosphorus and potassium efficiency can be increased two-fold with banding, particularly with lower rates placed with or close to the seed, while respecting seed safety. When costs are high or supplies are short, the greatest return on investment is with banded placement.

## Summary

Farmers can, and do, employ many of the above strategies in efficient fertilizer use. It is especially important in a time of uncertain input prices and availability. Farmers should maintain good communication with their trusted agricultural retailer through the winter months. Opportunities to price, and take delivery of fertilizer should be considered. An increasing number of farms do have on-farm fertilizer storage that permits greater flexibility in pricing and delivery.

## Contact Us

This fact sheet was developed by the Crop Fertility Specialist.

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