BENEFICIAL MANAGEMENT
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Improving Nitrogen Management in Atlantic Canada

Split Nitrogen Fertilizer Application

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Nitrogen (N) is a vital nutrient for crop growth, but its management presents challenges due to losses that can impact the environment and reduce agricultural efficiency. In Atlantic Canada, with its diverse climates and cropping systems, optimizing N use is essential. Split application of N fertilizer is a proven strategy to sustain yields with reduced N inputs, enhance N use efficiency, reduce environmental losses and support sustainable agricultural practices.

Why is Split Application Advantageous?

When all N fertilizer is applied at or before planting, the N sits in the soil for three to four weeks before the plants can take up the N. If there is rainfall during this period, which is often the case in Atlantic Canada, there is high potential for the N to be lost.

Benefits of Split Nitrogen Application

Splitting N applications involves distributing the total N fertilizer amount over two or more applications throughout the growing season, rather than applying it all at once at planting. This approach offers several benefits:

1. **Enhanced N Use Efficiency:** By matching N applications more closely with crop uptake patterns, plants utilize N more effectively, reducing the amount of N required and the likelihood of excess N in the soil that can be lost to the environment.

Q: When do you think the N fertilizer is more likely to be taken up by the crop?

A: Split application allows the producer to apply N when the plant can use it, improving agronomic and environmental outcomes.

2. **Nitrate-Based Fertilizer:** Split application is one of the only management approaches that allows for the more efficient use of nitrate-based N fertilizer sources.

3. **Reduced Nitrate Leaching:** Applying N closer to when crops can use it means less nitrate accumulates in the soil, reducing leaching into groundwater.

4. **Lower Nitrous Oxide (N_2O) Emissions by:** reducing excess nitrate accumulation, split application of N fertilizer can decrease the conditions favourable for N_2O production during denitrification.

5. **Improved Crop Yields and Quality:** Optimizing N availability leads to better crop growth, sustained yields and improved quality.

6. **Economic Savings:** More efficient use of N fertilizer reduces the amount of fertilizer needed, resulting in cost savings.

When Should I Apply my Split Applications

Split N application strategies often apply as much as 40 per cent of the fertilizer N at planting and the remaining 60 per cent later in the growing season when the plant is beginning its period of active N uptake. The method of application of fertilizer N in crop will depend on the crop. For row crops, there is often the option to band the fertilizer between rows. It is better to inject the fertilizer into the soil to reduce NH_3 loss from ammonium-based N sources. There is also the option to apply N fertilizer in crop as a foliar application. There are a number of N products that can be applied as foliar applications.

An additional advantage of split application is that it allows the grower to adjust their N rate to reflect the growing season. Beginning with the N rate needed to support the crop in an average year, the split application can be adjusted to reflect the climatic conditions in the early part of the growing season. In a good year, additional N can be added to take advantage of increased yield potential. In a poor year, the N rate can be reduced to reflect the reduction in expected yield.

Pre-planting: Planting can be a busy time. Producers often take advantage of the opportunity to apply fertilizer prior to planting, in combination with other fertilizers that are required in larger amounts, such a potassium fertilizer as part of seed-bed preparation. This is also a time when the broadcast application of N fertilizers can be incorporated into the soil to prevent ammonia loss. It is critical that N-sources applied now be protected so that losses prior to the period of N demand are minimized. Consider the use of protected N sources that will only become available six to eight weeks after application (dual-inhibited urea) and to reduce costs.

At Planting: During the planting operation, there is the opportunity to place nutrients with the seed and banded in proximity to the seed (usually two inches beside and below). It is important that the amounts and forms of N added at this time do not result in seed damage. Consider the use of:

- Small amounts (25 lbs/ac) of monoammonium phosphate (MAP) or diammonium phosphate (DAP) for seed emergence and early seedling establishment.

- Banding of small amounts (25 lbs/ac) of nitrate-based N fertilizer sources such as calcium nitrate or ammonium nitrate-based products.
- Use of ammonium-based products now should include a nitrification-inhibitor.
- Banding of dual-inhibited urea-based products.

In Crop: Applying fertilizers in crop allows for delaying N application to a time closer to crop demand and adjusting N rates to reflect crop yield potential based on early season growing conditions. The use of nitrification-inhibited or polymer-coated products may not be advisable at this time as the delay in nitrification may result in N becoming available after the period of plant N demand. Consider the use of:

- Banding of unprotected N sources. Unprotected urea should always be placed in the soil to limit ammonia loss.
- Broadcast or surface application of urease-protected urea or urea ammonium nitrate (UAN).
- Foliar application of urea-based products and UAN. The direct application of a urea-based N source, in small amounts, provides the opportunity to apply the N directly to the crop. This may be of advantage during drought conditions where there is limited water movement into the crop from the soil. These applications can be combined with the application of other agro-chemicals like fungicides to limit the number of trips to the field.

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