



# Kick-Off the Fall Season with Fertilization Management / Fall 2005

## Fertilizing for Minimum Impact on Water Quality

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Fall is the best time to take soil samples. It can also be a good time to apply some fertilizer and manure, but the risk to water quality needs to be managed. Using a phosphorus (P) index, that risk can be managed for the maximum benefit to soil and crop.

**F**ALL is the time when soil fertility management begins. Whether or not you apply fertilizer in the fall, it's essential to get started on the planning to ensure that next year's crop gets fertilized:

- at the right rate
- in the right place
- at the right time

This is the right time to begin making decisions!

### Soil Sampling

The starting point is diagnosis. Fall is an excellent time to take soil samples. It can also be a good time to review field notes from the past season, including plant analysis. All these sources of information, combined with your plans for crops, determine next year's nutrient needs.

### Why sample in the fall?

- After harvest, soil test levels don't change much.
- Get results in time to plan well for the next crop.
- Many labs are less busy in the fall than in the spring.

Some don't sample in the fall because they haven't yet decided what to grow the next spring. But that really shouldn't be a reason not to sample. Some labs providing results on the Internet now allow you to change the crop on-line for instant tailoring of recommendations. And how do you compare crop options without knowing what fertility each crop needs?

### What to apply in the fall

Should you apply in the fall? Just as the manufacturing industry is moving to "just in time" production, so producers are being encouraged to supply nutrients to crops on a "just in time" basis. That usually means applying in the spring—especially for nitrogen (N) and surface-applied phosphorus (P)—in the soils and climate of eastern Canada and

the northeast U.S. Even with inhibitors, fall is not the time to apply N for most crops of the Northeast Region. Too much can be lost.

But there are nutrients and situations where applying in the fall is a good idea:

- Lime and potassium fertilizers (K), since they don't easily move off the field, and don't pollute water even if they do.
- Many livestock operations need to apply at least some manure in the fall.
- To boost winter hardiness of forage legumes and grasses, K should be applied before the critical fall growth period starts.
- Starter N and P for winter wheat.
- Late fall N applications on turf for spring vigor.
- Controlled-release forms of urea (though they are best applied in the spring).

Ontario research looked at the question of whether fall applications of P and K could substitute for starter in the spring. The short answer was no. Whether fall fertilizer was applied or not, corn yielded less without P and K in the starter. Fall fertilizer applications are good for building soil fertility, but they have less direct impact on the crop.

An Ontario site in 2003 (**Table 1**) showed that in a field where large responses to P and K occurred, a combination of fall and spring P and K produced the highest yields. However, if you had to choose one or the other, spring would have been more effective than fall. The soil tests here were medium for P (16 parts per million [ppm] Olsen) and low-medium for K (58 ppm).

**Table 1. Corn yields (bu/A) in response to tillage and timing of P and K application.**

P and K applied	No-till	Fall plow
None	60	124
Fall	146	165
Spring	168	170
Both	178	176

However, planting corn and soybeans on time is essential for high yields. Having to put on a lot of fertilizer at planting risks delay. At higher soil test levels, the differences shown in **Table 1** get considerably smaller. Applying all the lime, most of the K and some of the P in the fall can help speed up planting, by reducing the total amount of starter or other fertilizer needed. Lower amounts of K in the starter reduce risk of salt injury, too.

#### Fall Fertilizer Application in the Northeast

Advantages	Disadvantages
Possibly lower prices	Cost of spending earlier
One less task during the busy spring	Less flexibility in planning
Spread the work of spreading manure	Risk of water contamination
Less chance of salt injury	Risk of loss of N

#### Identifying Source Areas: The Phosphorus Index

Fall-applied P, left on the surface, can enrich run-off water with P. In field areas that are less susceptible to run-off...those with well-drained soil, far from and less connected to streams or surface water...fall P applications can be effective and safe. In many landscapes, large areas almost never generate run-off. How can you find those areas?

**In most areas of North America, nutrient management specialists have developed a P index appropriate to local soils, climate, and cropping systems.** The P index identifies source areas. It involves a set of transport factors that may include estimates of soil erosion, run-off potential, subsurface drainage, contributing distance, and connectivity. Their calculation is part of a typical farm's conservation plan.

**These transport factors can be managed.** Crop and soil management practices that reduce erosion and minimize run-off, and watercourse management practices—like setbacks, buffers, and grassed waterways—that reduce connectivity, all reduce the risk of nutrients getting into surface water. Undoubtedly, some fields and parts of field will have higher inherent risks owing to their proximity to water and their texture and erodibility. These areas will need more careful management of nutrients, especially those applied in the fall.

For an example, see the on-line version of New York state's P index:  
><http://nmssp.css.cornell.edu/software/pindex/>.

**What's the value of doing a P index?** In a 98-acre watershed in Pennsylvania:

- Using it controlled loss of P and improved water quality [Veith et al., 2005].
- It showed that only three of the 22 fields contributed a major proportion of the loss, even though most of them had very high soil test P.



*Diligence keeps nutrients in the field and out of the stream.*

Using a P index can identify lots of land that can benefit from manure, and where time can be saved with fall fertilizer.

In some regions of North America, most surface run-off occurs during snowmelt and early spring rains. To fertilize for minimum impact on water quality, the focus needs to be on minimizing the nutrient available for transport from critical source areas. Such areas should likely not be fertilized in the fall, especially if nutrients are left on the surface.

**Even source areas may need nutrients.** If the soil is managed poorly, soil structure deteriorates, the soil's infiltration capacity declines, and both the size of the source area and the total amount of runoff increases. Manure can improve soil structure. In the long term, manured soils generate less run-off, because their better structure lets rain infiltrate more quickly [Gilley and Risse, 2000]. Guiding the applications of manure and fertilizer with the P index helps protect water quality. ■

#### References

- Gilley, J.E. and L.M. Risse. 2000. Run-off and soil loss as affected by the application of manure. *Trans. ASAE* 43:1583-1588.
- Veith, T.L., A.N. Sharpley, J.L. Weld, and W.J. Gburek. 2005. Comparison of measured and simulated phosphorus losses with indexed site vulnerability. *Trans. ASAE* 48(2):557-565.

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