

## Rethinking fall fertilization

September 26, 2019

Fall is arguably the most important season for turfgrass managers. While we're busy preparing for a new growing season in spring and trying to survive stressful conditions in the summer, fall is the time to recover from summer, renovate, and prepare for winter. It's a season of seeding, cultivation, weed control, and fertilization. While fall is still widely considered the most important time to fertilize turfgrass, the fertilization recommendations have evolved over the past decade.

Fall nitrogen applications are essential to promote plant regrowth, summer stress recovery, and maximize carbohydrate storage prior to winter. Previous recommendations were to apply nitrogen during early to mid-September and then make a heavy application of nitrogen fertilization at the end of the growing season (early to mid-November). The rationale was the cool weather stunted shoot growth while the nitrogen fertilizer was still taken into the plant because the soils are still relatively warm. Dr. Soldat's group at UW-Madison actually found that nitrogen uptake was lower during the end of fall compared to earlier in the season (Fig. 1). This occurs because [reduced water use \(evapotranspiration\)](#) [slow N movement to turf roots](#) and cooler soils reduce N uptake in very late in the fall. As a result, N from late fall fertilization either sits in the soil all winter or it is lost through processes such as leaching (especially in sand-based soils during high precipitation winters). This work has since been replicated and confirmed by researchers at the University of Minnesota and Penn State University.

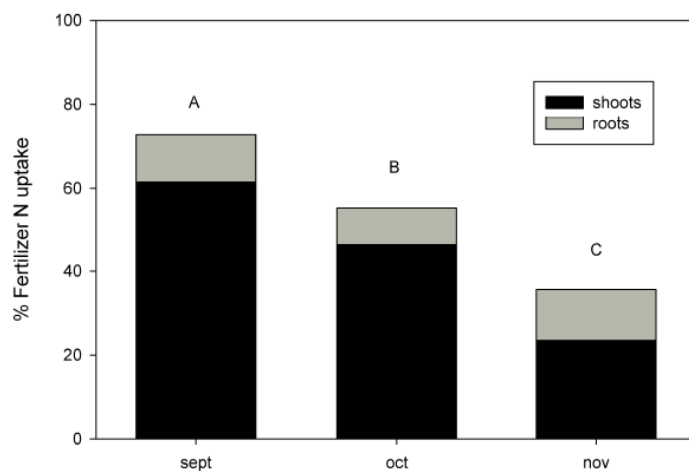


Figure 1. Nitrogen fertilizer uptake efficiency declines later into the fall. Fertilizer that is not taken up by the plant sits in the soil until the following spring or it is leached out during winter. Avoid late season apps that are inefficient. September fertilization is best to maximize recovery and prepare for winter. Courtesy of Dr. Doug Soldat

Fall potassium (K) fertilization is important for cold tolerance of warm-season turf, but research on cool-season turfgrass is less conclusive. Dr. Jim Murphy and Dr. Chas Schmid showed annual bluegrass was [unable to harden off for winter when soil and tissue potassium were very low](#) (less than 30 ppm K or 2% tissue K). This made annual bluegrass more susceptible to winterkill. However, Dr. Soldat, Dr. Micah Woods, and Dr. Dave Moody have proven that very high levels of K fertilization can actually increase snow mold in creeping bentgrass and bentgrass/*Poa annua* mixed stands of turf.

**Suggestions for fall fertilization of cool-season turf are as follows:*****Sand-based turf systems (i.e. golf greens, tee, athletic fields):***

Continue to spoon-field soluble nitrogen sources (i.e. urea, ammonium sulfate, liquid fertilizers) into the fall. Gradually reduce nitrogen rate as evapotranspiration and soil temperature declines. Final application should be made once growth rate has ceased for the season.

For granular-based programs, apply 0.5 to 1.0 lbs of nitrogen from a slow release fertilizer in early to mid-September while uptake efficiency is still high. Aim for a product with at most 50% slow release nitrogen. Also consider using a product with a low SGN to reduce the potential of mower pick-up. [If fertilizing in October](#) (Fig. 2), use a granular fertilizer that is mainly water soluble (urea, ammonium sulfate, etc.).

For potassium, [aim for a 1:1 N to K<sub>2</sub>O ratio](#) only if the surfaces have a significant proportion of annual bluegrass or if a [soil test reports the soil is deficient \(less than 35 ppm K<sub>2</sub>O – Mehlich-3\)](#). Adding potassium fertilization in other situations – bentgrass or Kentucky bluegrass species or if soil tests levels for K<sub>2</sub>O are sufficient – is not necessary and may increase the likelihood of snow mold.

***Soil-based turf systems (i.e. lawns, athletic fields, golf fairways):***

Apply controlled release granular products in mid-September at 0.7 to 1.0 lbs/1000 ft<sup>2</sup>. Aim for a product with less than or equal to 50% slow release nitrogen. If additional nitrogen fertilization is required later in the fall, use fertilizers that are mainly quick release nitrogen. Don't apply nitrogen after mid to late-October depending on your location within Nebraska. In addition to increase risk of leaching, these applications can cause excessive spring growth. This increases mowing requirements in spring and depletes carbohydrates prior to summer. [Apply potassium based on soil test recommendations](#).

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Figure 2. Nitrogen fertilizer response on a creeping bentgrass putting green in Madison, WI on November 7, 2008. 100% quick release nitrogen was applied at 1.0 lbs/1000ft<sup>2</sup> on September, October, or November 15<sup>th</sup>. October application provided the best fall color but the September application had the best nitrogen uptake. The best way to fertilizer sand based turf is to continue spoon feeding until turfgrass slows in the end of October. Courtesy of Doug Soldat