ATHLETIC TURF

Phosphorus bans ignore problem's real causes

Feb 17, 2009
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Athletic Turf News

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A phosphorus “ban” is the popular press term for government ordinances or laws regulating fertilizer phosphorus (P) applications on turfgrass. Banning phosphorus applications to turfgrass has become the “in thing” for government officials across the country.

The scope of these bans extends from local communities to entire states. Originally restricted to home lawns, bans are now being extended to all types of managed turfgrass.

The well-intentioned objective is to improve surface water quality that has been or is being degraded by excessive algae growth. Scientists are in near-universal agreement that the key to curtailing algae growth is to starve the organism for phosphorus.

Banning P fertilizer application to turfgrass is predicated on two assumptions.

First is that the quantity of phosphorus in runoff water from turfgrass constitutes a major portion of the total phosphorus loads annually entering lakes and streams. If not, the bans will not improve surface water quality.

Second, the bans assume fertilizer is the primary source of phosphorus in runoff water from turfgrass established on home lawns, athletic fields, and golf courses.

Key Runoff Issues

It is relatively simple to collect runoff water and measure its phosphorus concentration, but these numbers alone have little real value and can be very misleading about surface water contamination. What has to be disclosed is the quantity of P in the runoff water. Then, and only then, can turfgrass runoff water be assigned significance in terms of the total quantities of P (the P “load”) being delivered to surface waters.

Determining quantities of phosphorus requires measurement of runoff volumes in addition to the P concentrations in that water. This is where the design of studies of phosphorus losses from turfgrass takes on a complexity many researchers have shied away from. In some instances runoff water volumes have been estimated using computer models for urban areas. Computer models also are being applied to estimate what a phosphorus ban might do for lake water quality.

How reliable are these estimates? Consider for a moment your local weather forecasts: They, too, are based on computer models.

The second key issue regarding research on phosphorus in turfgrass runoff water is time frame. Studies conducted in Minnesota, New York, and Wisconsin have clearly shown that in these states, at least 70 percent and in some years up to 99 percent of the annual water runoff and P loss from turfgrass is associated with snow melt. Yet in numerous studies runoff water has been collected only during the growing season or over even shorter time frames. This can grossly distort the estimate of P load in turfgrass runoff water and lead to erroneous conclusions regarding the sources of that phosphorus.

Turfgrass vs. Other Uses

Minnesota, New York, and Wisconsin researchers have recently recorded turfgrass runoff water P loads for 12-month periods. The turfgrass runoff P load ranged between 0.12 and 3.18 lbs. of phosphorus per acre, averaging 0.7 lbs. per acre. Phosphorus loads in runoff water from agricultural lands can vary anywhere between 0.5 and 18.0 lbs. per acre, depending on type of crop grown, fertilization practices, soil characteristics, and weather.

Perhaps a more realistic value for comparison with turfgrass is the 2.5 lbs. of phosphorus per acre per year recently reported for the runoff water from two rural Iowa watersheds with combinations of annual row and perennial crops. Runoff water P loads from forested areas are quite consistently at the lower end of the range for turfgrass. Side-by-side comparisons between turfgrass and prairie in Wisconsin have shown no differences in runoff water phosphorus loads.

The logical conclusion is that runoff water P loads from turfgrass are generally greater than for forests, do not differ significantly from native vegetated areas such as prairies, and on average are one-third or less than those from agricultural land.

Many Factors in Play

That means what turf areas contribute to the total annual phosphorus loading of a particular lake depends very much on the breakdown in type of land use in the watershed draining into the lake.

It also depends on the sources of water feeding into the lake. For some lakes a significant and sometimes dominant source is groundwater, while a few are predominantly spring-fed. Source of water inputs is but one of many factors that impart unique characteristics to individual lakes.

If careful study of a particular lake indicates turf areas may be a major source of the annual phosphorus load, the question then becomes what is the most effective means for reducing that load. To answer this, one must know the sources of phosphorus in turfgrass runoff water.

To many people the answer is simple—fertilizer. However, researchers have consistently found higher phosphorus loads from unfertilized than fertilized turfgrass. The Minnesota, New York, and Wisconsin research has shown on average 95% of the annual phosphorus load from turfgrass is collected in the winter months and several months after the most recent fertilizer phosphorus application.

I will address that issue in the next installment of this series.

Article Source: *Environment and Climate News*, Feb. 09