



Mavis Consulting, Ltd Newsletter

Turf & Soil Fertility Specialist

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Can or Should I apply Phosphorus?

As you are most likely aware, “Beginning **January 1, 2012**, the Michigan Fertilizer Law restricts phosphorus fertilizer applications on residential and commercial lawns, including athletic fields and golf courses statewide. This includes applications by both homeowners and commercial applicators. Starting January 1, 2012, a person shall not apply any fertilizer with available phosphate (P₂O₅) to turf. Available phosphate (P₂O₅) may be applied at specified rates* under the following instances:

- o When a soil test or plant tissue test indicates phosphorus is needed;
- o For new turf establishment using seed or sod;
- o A finished sewage sludge (biosolid), organic manure or a manipulated manure (like compost). The application rate is limited to 0.25 pounds of **Phosphorus** (= 0.57 pounds of P₂O₅) per 1,000 square feet.
- o On golf courses whose manager(s) have completed a MDARD approved training program. At this time, the **Michigan Turfgrass Environmental Stewardship Program** is the only approved program.

* These application rates are available at www.BePhosphorusSmart.msu.edu or <http://www.turf.msu.edu/assets/ArticlePDFs/MSU-Soil-Testing-Lab-P-Recs-BrayP1-Olsen.pdf> (Hunt, “New Legislation Restricts Phosphorus Fertilizer Applications on Turf”)

<http://www.turf.msu.edu/assets/ArticlePDFs/Phosphorus-fertilizer-article-for-MNLA-Nov-2011-final-v2.pdf>

<http://www.turf.msu.edu/phosphorus-restrictions-resources>

Be aware that there is a difference in test results when utilizing the colorimetric and the inductively coupled plasma (ICP) methods. The ICP method detects more forms of Phosphorus and will typically result in higher readings (10-15 ppm) than colorimetrically (<http://www.ipm.iastate.edu/ipm/icm/2003/11-17-2003/mehlich.html>). ICP is used only for the Mehlich 3 extractant and not the Bray or Olsen extractants. Therefore adjustments need to be made to the desired values in Table 1, which are determined colorimetrically, if ICP testing is utilized. At this point no conversions have been accepted and colorimetric Bray and Mehlich testing must be done for comparable test results. Most commercial testing (including Brookside Labs unless otherwise requested) is conducted utilizing the ICP, so be sure to check testing methods for your Phosphorus readings. Starting this year I will have the colorimetric Bray or Mehlich 3 Phosphorus test added to Michigan soil samples unless conversions are accepted

The guidelines on the websites listed above indicate that no applications of Phosphorus are to be applied (unless tissue test indicates deficiency or there is new turf being established) when standard soil analyses report 20 ppm of Phosphorus for the Bray 1 and Mehlich 3 soil tests (colorimetric). Most soil reports indicate Phosphorus levels in pounds per acre of P₂O₅. In order to convert ppm to lbs./A:

$$\text{ppm} \times 4.58 = \text{lbs./A}$$

$$20 \text{ ppm} \times 4.58 = 91.6 \text{ lbs./A}$$

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There are also different limitations based on different areas and mature turf or newly established turf as well as different testing extractants (see Table 1). Data from over 200 soil samples collected throughout Michigan golf courses and athletic fields during the fall of 2011 indicates an average Phosphorus level of 420 lbs./ A utilizing the Mehlich 3 extractant and the ICP. The data from nearly 100 saturated soil analyses conducted on some of these same soil samples indicate an average of 2 ppm (desired value for Mavis Consulting = 1 ppm). This indicates that there are some issues with Phosphorus availability even when standard soil reports indicate more than sufficient levels.

Phosphorus availability can be significantly reduced in soils with high pH or very high Calcium levels. The average soil pH for the 200 soil samples was 7.6 which suggests Phosphorus fixation by Calcium. Furthermore, most top-dressings sands utilized are mildly or highly Calcareous (Calcium Carbonate) causing even more reduced Phosphorus availability. In this situation the best way to determine Phosphorus need is to utilize the Saturated Soil Analysis and possibly tissue testing.

Table 1. MSU Soil Testing Lab Recommendations for Phosphorus Applications to Turfgrass

		Sand based rootzone establishment	Golf greens and tees est. or mature; Kentucky bluegrass or perennial ryegrass athletic fields est. or mature; sand based rootzone mature	Lawns, golf course fairways; establishment or mature
Bray P1, Mehlich 3 Soil Test Value (ppm): pH<7.4	Olsen Soil Test Value (ppm) pH>7.4	Recommendation (lbs. P ₂ O ₅ /1000 ft. ²)	Recommendation (lbs. P ₂ O ₅ /1000 ft. ²)	Recommendation (lbs. P ₂ O ₅ /1000 ft. ²)
0	0	4.4	3.4	2.5
2	1.3	4.1	3.1	2.2
4	2.7	3.9	2.7	1.9
6	4	3.6	2.4	1.6
8	5.3	3.4	2.0	1.3
10	6.7	3.1	1.7	1.0
12	8	2.8	1.4	0.7
14	9.3	2.6	1.0	0.4
16	10.7	2.3	0.7	0.1
18	12	2.1	0.3	0.0
20	13.3	1.8	0.0	
22	14.7	1.5		
24	16	1.3		
26	17.3	1.0		
28	18.7	0.8		
30	20	0.5		
32	21.3	0.2		
34	22.7	0.0		

Does Phosphorus really move if applied to established turf? Based on most research and data I have collected over the past 11 years on golf courses and athletic fields throughout the Midwest, there are little to no issues with Phosphorus loading into the surface water going through the property. "Removal of Phosphorus from soils into local waters tends to be associated most with the removal of adsorbed Phosphorus on soil particles by erosion than by leaching of Phosphorus in solution to the underground water table." (BLI Reference Manual 9-8). Based on nearly 100 surface water samples collected in Michigan, there are no instances where the water leaving the golf course property or athletic field site that indicate higher Phosphorus than when the water enters the property. In addition, the only excessive Phosphorus level detected since 2001 (9.7 ppm) was reduced to <0.2 ppm in the water leaving the property.

During a presentation by Dr. Kevin Frank at The Inn at St. Johns, the following information was given:

- Data (tissue or soil) is needed once every three years.
- Data should be collected from areas with differing soil type (sand green vs. soil green)

Some additional questions yet to be answered:

- What are the acceptable ICP Phosphorus test levels?
- Are deficient Phosphorus levels on Saturated Soil Reports acceptable to permit application?
- How much Phosphorus can be applied if tissue or saturated soil reports indicate deficient levels?

In Summary, are you as a turf manager doing what is best for your operation and the environment? The average Phosphorus levels in soils and tissues indicate little need for application at this time. Even if your property is certified through the MTESP, I recommend taking a look at your current and past data before making decisions on which fertilizer products to apply. If your data is produced utilizing the ICP Mehlich 3 testing and test results are near or lower than the colorimetric guidelines, then I recommend conducting colorimetric testing to determine allowable application rates. When applying organic based products no more than 0.57 pounds of P₂O₅ per 1000 square feet can be applied at one time.