

Survey of Home Lawn Soil Phosphorus Levels in Tippecanoe County Indiana

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Objective

To gain a better understanding of the nutrient status of lawn soils in Tippecanoe County and determine if current recommendations to achieve a healthy dense turf need revision.

Rationale

Sufficient soil phosphorus (P) is critical for rapid seedling establishment and to sustain the health of mature turf. Applying starter fertilizers (fertilizer high in P, e.g. 12-24-12) at rates of 1-1.5 lbs P₂O₅/1000ft² is accepted as necessary for turf establishment (Figure 1). Annual applications of 1-1.5 lbs P₂O₅/1000ft² is required to maintain mature turf on soil deficient in P (0-25 lbs/A). Phosphorus runoff from agricultural land contamination is linked to declining water quality. Therefore, when soil erosion occurs P moves soil into storm drains, streams and other water sources. Some states have already enacted bans on P fertilizer applications unless applied by a certified applicator or a soil test shows a need for additional P in deficient areas. The potential pollution from fertilizing home lawns however has not been well documented. A survey was put together to determine the P-levels in Tippecanoe County, IN. Understanding the soil requirements for areas such as Tippecanoe County and across North Central, Indiana will help turfgrass scientists make environmentally responsible fertilizer recommendations for both seedling and mature turf areas.

How It Was Done

A soil survey of 102 home-lawns varying in turf species, age, nutrient inputs and P levels were tested across Tippecanoe County, IN. A single diagonal transect was established across each lawn and ten core samples were collected along this transect to a depth of 3". Thatch remained with the samples. The samples were processed at a regional soil testing lab. A report was sent back with information regarding nutrient levels and recommended fertilizer applications based on turfgrass species and nutrient status of the soil.

Results

- Phosphorus levels across all lawns sampled averaged 45.4 mg P kg⁻¹. This is more than double what Purdue University currently states as adequate (13-25 mg P kg⁻¹) levels of P in Indiana soils. (Table 1)
- P-Level Results (Figure 2A):
 - 12% of the home lawns tested had low (<13 mg P kg⁻¹) P levels.
 - 22% of the home lawns tested had adequate (13-25 mg P kg⁻¹) amounts of P
 - 67% of the home lawns tested had high (>25 mg P kg⁻¹) amounts of P
- Varying turf species showed differences in P concentrations (Figure 2B). Lawns comprised of Tall fescue (*Festuca arundinaceae*) and perennial ryegrass (*Lolium perenne*) showed higher levels of phosphorus as compared to lawns comprised of tall fescue and Kentucky bluegrass.

Future Studies

- More soil sampling without thatch will be taken.
- Greenhouse study will be conducted to determine critical P levels for rapid seedling establishment.

- Erosion study will be performed to quantify P runoff losses from newly seeded turfgrass areas receiving pre-plant P applications and determine effects of P runoff with varying site preparations prior to application of pre-plant P applications.

Acknowledgements

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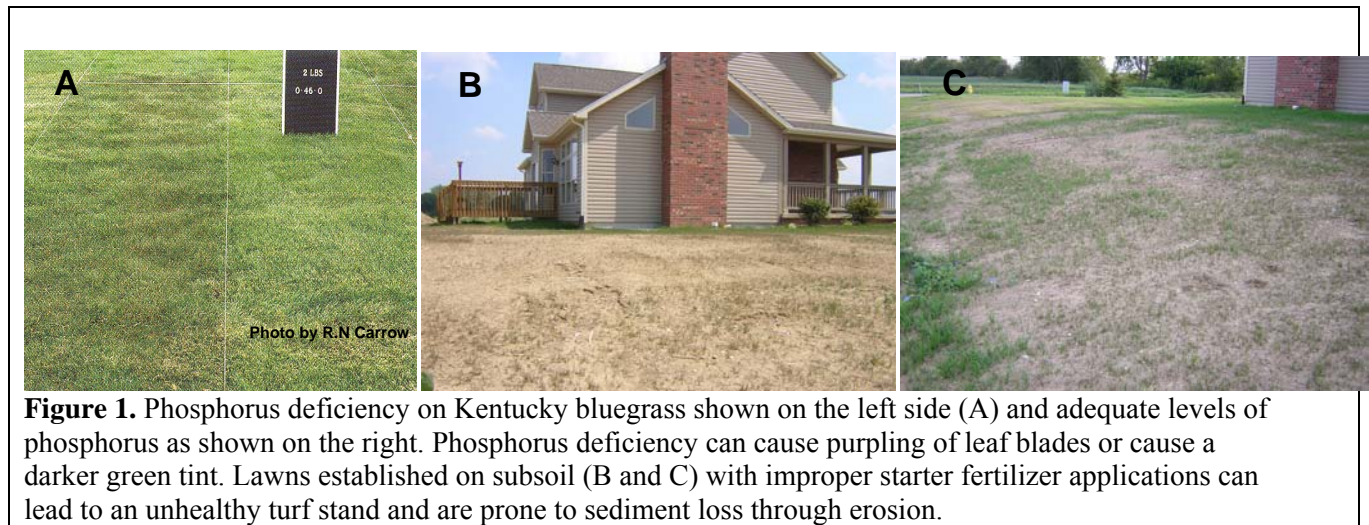


Figure 1. Phosphorus deficiency on Kentucky bluegrass shown on the left side (A) and adequate levels of phosphorus as shown on the right. Phosphorus deficiency can cause purpling of leaf blades or cause a darker green tint. Lawns established on subsoil (B and C) with improper starter fertilizer applications can lead to an unhealthy turf stand and are prone to sediment loss through erosion.

Table 1. Current recommendations for annual phosphorus (P_2O_5) applications for established turf and newly seeded or sodded lawns based on soil test results. Z. Reicher and C. Bigelow. Purdue University, 2004.

Soil Test Results				
Level	lb. P/Acre	mg P kg^{-1}	New Sod or Seed lb. P_2O_5 /1000ft ² /year	Annual Applications lb. P_2O_5 /1000ft ² /year
Low	0-25	0-13	1.5	1.5 ^a
Normal	26-50	13-25	1.0	1.0
High	51+	25+	1.0	0.0

^aTo increase the amount of phosphorus applied while maintaining the same amount of nitrogen applied, use a fertilizer high in phosphorus for the late fall application. The phosphorus (P) percentage should be larger than the nitrogen (N) and potassium (K) percentage. An example would be 5-10-5 or 17-23-6.

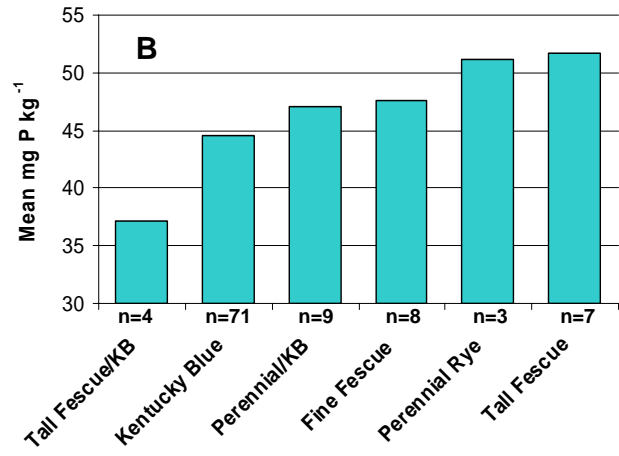
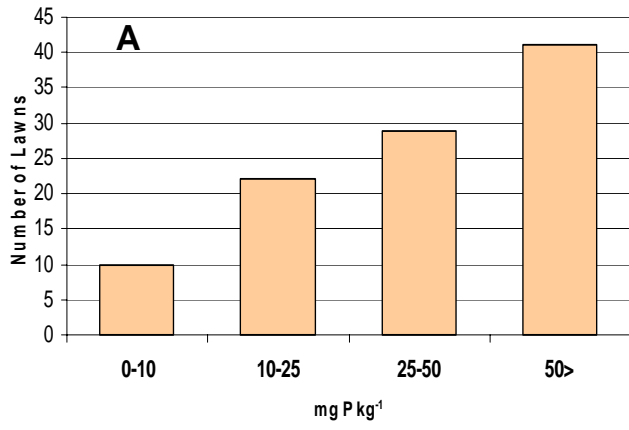


Figure 2. Phosphorus ranges in lawns of study and varying turfgrass species