LOUISIANA HOME LAWN SERIES

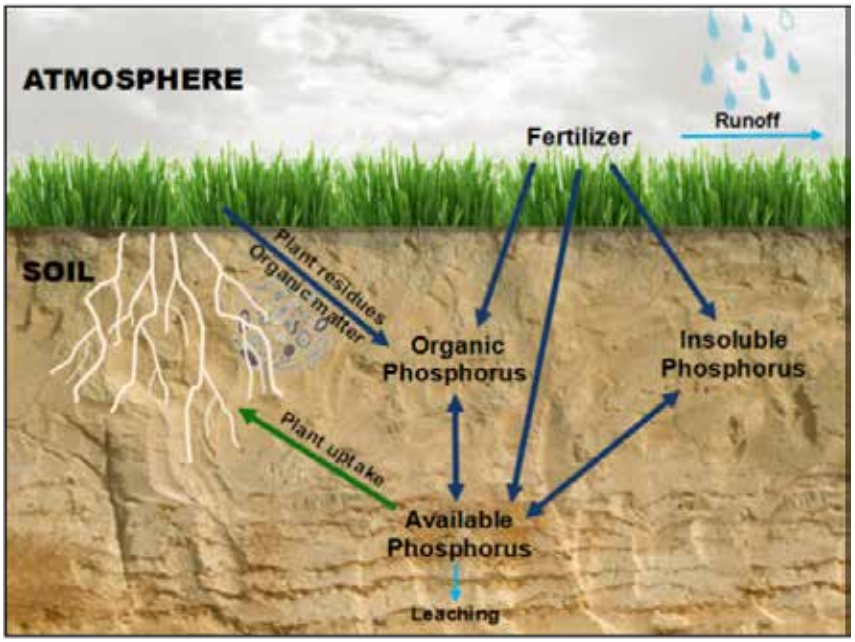
A guide to maintaining a healthy Louisiana lawn

Phosphorus

Phosphorus is an essential nutrient for turfgrass growth and development. Management of phosphorus has become increasingly important because of its association with waterway impairment. Although phosphorus is found in lower concentrations within the plant compared to nitrogen, phosphorus is important to turfgrass metabolism and structure. Sufficient phosphorus levels allow for proper root growth; greater stress tolerance; and water-use efficiency in turfgrasses. in turfgrasses. However, insufficient phosphorus levels can result in stunted growth and leaf discoloration. Understanding the role of phosphorus in turfgrass is not only important for maintaining a healthy turfgrass but also in reducing offsite movement into surface waters. Learning a few basics concerning phosphorus can help you develop a sound fertility plan for your lawn.

Phosphorus plant uptake: Phosphorus in the soil is available for plant uptake in the form of orthophosphates (H_2PO_4 and HPO_4). Organic phosphorus can also be found in higher concentrations in soil organic matter that can be released over time. The rate of organic matter decomposition by microorganisms in the soil depends on environmental factors such as temperature, moisture and soil pH. However, once phosphorus is available for root uptake it is also available to form complexes with other nutrients and mineral surfaces in the soil. Factors such as soil pH and available elements will affect phosphorus plant availability. When soil is acidic (a pH lower than 7), phosphorus can bind to aluminum and iron. When soil is basic (a pH greater than 7), phosphorus can bind to calcium. Once phosphorus binds to other nutrients or clay particles, it becomes tied up as insoluble phosphorus and is unavailable for plant uptake. It is critical to know the type and composition of the soil to know the potential availability of phosphorus. Maintaining soil pH between 6 and 7 can increase phosphorus availability. Phosphorus can be added to the soil through fertilizer application. Always have your soil tested before applying fertilizer.

Phosphorus losses: Phosphorus can be lost through leaching, runoff and erosion. Leaching occurs when water moves available phosphorus downward through the soil where it is inaccessible to plant roots for uptake; however, leaching losses are relatively minor except in highly sandy soil. Phosphorus readily binds with nutrients or soil particles with losses occurring more readily through surface runoff and erosion. Runoff occurs when precipitation or irrigation exceeds the infiltration into the soil. Excess water drains from the turf surface, carrying substances such as dissolved fertilizer offsite.



Phosphorus deficiency: A common visual symptom of phosphorus-deficient turfgrass is stunted growth with older leaves turning purple. However, phosphorus is not the only essential nutrient or stress that can lead to leaves purpling, so soil testing is important. Soil test analyses can indicate if adequate levels of phosphorus and other essential nutrients are present. Also check to make sure diseases or insects are not causing stunted growth or discoloration.

When to apply: Phosphorus fertilizer should be applied only when the turfgrass is actively growing. It is best to apply in spring when turfgrass is fully out of dormancy and has been mowed several times. Be careful when applying fertilizers that have other nutrients, such as nitrogen. If application rates are based on nitrogen, then there is a potential for overapplication of phosphorus.

Purpling leaves in centipedegrass

January	February	March	April	May	June	July	August	September	October	November	December
Turfgrass dormant		Turfgrass active growth season								Turfgrass dormant	

Fertilizer sources: Listed are some common sources of phosphorus. Release of phosphorus can vary depending on the type of phosphorus fertilizer source applied and the environmental conditions at the time of application. Read the manufacturer's label for specific information before purchasing or applying any fertilizer.

Source	*Percent Phosphorus (P_2O_5)
Monoammonium phosphate (MAP)	48 - 62%
Diammonium phosphate (DAP)	46 - 53%
Monopotassium phosphate	51%
Dipotassium phosphate	41%
Rock phosphate	25 - 40%
Triple superphosphate	44 - 53%
Manures	Varies
*based on information from Turfgrass Soil Fertility and Chemical Problems, Carrow, R. N.; Waddington, D.V.; Rieke, P.E; 2001.	

How to calculate phosphorus fertilizer

Proper calculation can be advantageous in regards to cost, turfgrass health and environmental sustainability. Below is a basic calculation for solid (dry) fertilizers. ***Always test your soil and apply phosphorus (P) according to the test result recommendations.***

Calculation requirements

1. The area of your lawn in square feet (ft^2) that will be fertilized.
2. The rate of the phosphorus, in pounds of phosphorus (P_2O_5) per 1,000 ft2, that you will be applying.
3. The fertilizer analysis on the fertilizer bag (N-P-K).

Calculating Fertilizer

Step 1. Multiply the total area by square footage (ft^2) of your lawn by the appropriate rate of phosphorus (in the form of P_2O_5). This calculation will result in the amount in pounds (lbs.) of phosphorus (P_2O_5) that is required to fertilize to the entire lawn area. For example:

$$5{,}000 \text{ ft2 lawn area} \quad x \quad \frac{1 \text{ lb. } P_2O_5}{1{,}000 \text{ ft}^2} \quad = \quad 5 \text{ lbs. of } P_2O_5 \text{ (solution A)}$$

Step 2. Divide the amount in pounds (lbs.) of phosphorus (P_2O_5) required to fertilize the entire lawn area (solution A) by the percent of phosphorus (P_2O_5) contained in the fertilizer as labeled on the bag. Remember to put the percentage of phosphorus (P_2O_5) into decimal form (ex: 25 percent = 0.25). This calculation will result in the amount (lbs.) of fertilizer required to fertilize the entire lawn area. For example:

$$5 \text{ lb. of } P_2O_5 \quad \div \quad 0.25 \quad = \quad 20 \text{ lbs. of fertilizer}$$

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