

Getting the most out of your lawn soil test report

Improve turf quality as well as protect the environment with proper fertilization

- Follow the NYS Nutrient Runoff Law Article 17 Title 21 (January 2012).
- Apply nitrogen (N) to meet your needs AND protect the environment.
- Never apply more than 1 pound (lb.) of nitrogen per 1,000 square feet (sq. ft.) per application.
- Focus on fall fertilizer applications.
- Leave grass clippings.

There is no benefit to applying more fertilizer than your lawn requires.

Proper fertilizer applications will improve the quality of your lawn, crowd out weeds and help it withstand and recover from wear and tear as well as heat and drought. Remember, over fertilization can be harmful to both your lawn and the environment and it wastes money.

If your lawn is thick with desirable grasses, has an acceptable level of weeds and color that is pleasing to you, your lawn does not need any additional fertilizer. Your lawn is getting enough nutrients released from the previous fertilization, the soil and the clippings left after mowing.

If your lawn is thinning out, bare soil is apparent and weeds are taking over, it is time to adopt practices that can make turf thicker. A thick lawn can help reduce leaching of nitrates into the groundwater as well as reduce soil erosion and runoff that can move nutrients off site. A thick lawn will also increase the water available to your lawn by allowing more water to infiltrate into and be retained in the grass canopy and soil.

Fertilizing our lawns provides nutrients that are not adequately supplied by the soil or by natural soil processes. Nutrients required by grass in the highest quantity are nitrogen (N), phosphorus (P) and potassium (K). Other nutrients are also required but are usually available in adequate quantities when the pH is in the proper range.

Soil pH in the 6.0 to 7.5 range is optimal for the health of lawns.

Soil pH measures the acidity or alkalinity of the soil. **Lime** is used to raise the pH when the pH is 6.0 or lower. **Sulfur** or acidifying fertilizers (like ammonium sulfate or ammonium nitrate) are used to lower soil pH when the pH is above 7.5.

Modifying the pH is best accomplished before planting so the material has time to work in the soil and improve the root zone. Apply only the recommended amount and mix into the upper 4 to 6 inches of soil. If the lawn is established follow recommended rates and be sure to water in the material. Do not apply more than 50 pounds (lbs.) of lime per 1,000 square feet per application. If your lawn requires 50 lbs. or more split the application and apply the other half in 3-6 months. Check pH every few years.

The nutrient content (fertilizer analysis) is printed on the bag of fertilizer.

The first number indicates the *percent* of nitrogen (N), the second number is the *percent* of phosphate (P_2O_5) a source of phosphorus, and the third number is the *percent* of potash (K_2O) a source of potassium. They are simply referred to as N-P-K. A 50 pound (lb.) bag of 10-6-4 actually contains 5 lbs. of N, 3 lbs. of P_2O_5 and 2 lbs. of K_2O . The rest of the material is made up of other inert material, such as sand or clay granules to help spread the fertilizer.

When nitrogen (N), phosphorus (P) and potassium (K) are all needed a *complete fertilizer* that contains all 3 nutrients can be used. For example: 10-6-4, 28-3-10, 32-4-8.

Recommendations will only be made if nutrients are deficient. It is possible that your soil may have adequate levels of phosphorus (P) or potassium (K) and only nitrogen would be needed.

The New York State Nutrient Runoff Law Article 17 Title 21 (January 2012) states that fertilizers containing more than 0.67% phosphate (P_2O_5) can be used on lawns **ONLY if** establishing a new lawn or if a soil test indicates it is needed on established lawns. Composts are exempt from this law. Retailers must display fertilizer that contains phosphorus separately from other fertilizers and must post signs notifying customers of the terms of the law.

Nitrogen (N)

Nitrogen produces vigorous growth, improves turf thickness, and gives grass its dark green color.

Insufficient nitrogen levels can lead to poor growth, increased chance of certain diseases and thin turf that can allow weed invasion and soil erosion. Too much nitrogen, beyond

what the grass needs, can increase the presence of certain diseases, increase weed pressure and possibly pollute our drinking water.

The nitrogen content of a soil sample does not necessarily reflect the future availability of nitrogen because unlike phosphorus and potassium, the nitrogen level will fluctuate depending on biological activity and soil conditions. Nitrogen is one of the most important nutrients for plant growth and is needed in relatively large amounts by all plants, so a standard nitrogen recommendation is routinely provided for lawns.

Nitrogen rates to meet your lawn's needs AND protect the environment.

Knowing the kind of grass, intensity of lawn use, quality expectations, site conditions (sunny vs. shady) and maintenance practices (clippings left in place or removed) helps determine the amount of nitrogen fertilizer needed.

Good lawns are usually not irrigated, do not receive pesticide applications, are mowed infrequently with clippings returned and don't receive much use. These lawns may need no fertilization or at most one application of nitrogen per year.

Better lawns which receive more care and more use, may need up to two applications of nitrogen fertilizer per year (up to 1 pound (lb.) of nitrogen per 1,000 square feet (sq. ft.) of lawn per application twice a year). Clippings are returned.

Highest quality lawns are often irrigated, are mowed regularly, may require pesticide applications and are used often for outdoor activities. These lawns may typically need two to three applications of fertilizer per year (up to 1 pound (lb.) of nitrogen per 1,000 square feet (sq. ft.) of lawn per application, two or three times a year) and occasionally up to 4 applications a year when in full sun, heavily used and clippings are removed.

Never apply more than 1 pound of nitrogen per 1,000 square feet per application.

Fertilize your lawn at the right time to ensure the grass is fed when it is most beneficial.

Early fall is an excellent time to fertilize lawns especially if you plan to fertilize only once per year. The best window for application is after top growth stops, usually after 10 days with average daily temperatures below 50°F. Organic nitrogen sources alone are not a good choice for fall as they require microbial action that happens in warm soils to release nitrogen. In New York State it is against the law to fertilize between December 1 and April 1. During this time the likelihood of fertilizer leaching beyond the root zone and into the ground water is high. Check your local laws to learn of more restrictions. Several counties have more restrictive laws.

Although you can fertilize during the summer months this is not the most beneficial time for our cool season grasses. Their growth slows down and they are often under lots of stress unless irrigated. Other times are listed in **Chart A**.

Chart A: Timing of nitrogen fertilizer applications based on use and quality

Lawn Use and Desired Quality	Number of Applications (no more than)	SPRING		SUMMER		FALL	
		early April	late May	early June	late August	early September	late October
Little lawn use and good quality (including shady sites)	0-1	<----->		<----->		⊕----->	
Little lawn use and better quality	1-2	<-----*->		----->		⊕----->	
Moderate lawn use and better quality	2-3	<-----*->		----->		⊕-----*->	
Little lawn use and highest quality	3	<-----*->		----->		⊕-----*->	
High lawn use and highest quality	4	<-----*->		*----->		⊕-----*->	

Key: <-----> Legally allowable fertilizing period
 * Recommended application times
 ⊕ Best recommended application time

Fertilize less when grass clippings are left or when lawn is growing in a shady site. Returning the grass clippings to your lawn can eliminate the need for any phosphorus fertilizer and reduces the need for nitrogen fertilizer by 25 to 50 percent.

Parts of your lawn that are shady need about half the amount of nitrogen fertilizer as the sunny parts, so fertilize them less.

Follow the law and best practices when applying fertilizer.

- Never apply fertilizers to frozen ground or water-logged soils. **The New York State Nutrient Runoff Law** states the application of any fertilizer on non-agricultural lawns and turf is prohibited between December 1 and April 1. (November 1 to April 1 for Suffolk County, November 15 and April 1 for Nassau County, and other locales may have more restrictive laws.)
- Application of any fertilizer within 20 feet of a water body is also restricted according to the law. You must use a drop or shielded spreader and be no closer than 3 feet from the water.

- The law also mandates fertilizer spilled on impervious surfaces must be cleaned up immediately. Avoid using rotary spreaders near water or impervious surfaces like roads, driveways and sidewalks, especially if your spreader does not have a shield.
- Do not fertilize if a heavy rainfall is expected within 2 days of application.
- Do lightly water lawn with about a ¼” of water to wash the fertilizer off the leaves and into the soil.

Nitrogen fertilizer sources to protect water quality.

You can find information about the source of fertilizers on the fertilizer bag. **Slow release nitrogen sources** are less likely to leach and become water pollution. These include coated products of urea (sulfur-coated or polymer coated) which are a type of **synthetic organic fertilizer**.

Water soluble sources of nitrogen are quickly available to plants. Care should be taken when using *water soluble* sources because they are made of salts which can burn plants. Also, if over applied, watered in excessively or applied before a heavy rain, they can leach beyond the root zone and end up in the ground water and negatively impact water quality. *Water soluble* fertilizer sources include **inorganic fertilizers** that are mined materials and/or manufactured products and do not contain carbon. Some examples include: calcium nitrate, ammonium sulfate, ammoniated phosphates and calcium and potassium nitrate (Chilean nitrate).

On lawns with fine-texture soils, i.e. **non-sandy soils**, the application of no more than 1 pound of nitrogen per 1,000 square feet should have at least 30 percent slow release nitrogen. Research shows that nitrogen rarely leaches from lawns containing silt and clay.

On lawns with coarse-textured soils, i.e. **sandy soils**, the application of no more than 1 pound of nitrogen per 1,000 square feet should have at least 60 percent slow release nitrogen to minimize leaching and water pollution.

Organic fertilizers contain carbon and are derived from living organisms. Corn gluten meal, feather meal, composted manure and bio-solids are examples of **natural organic fertilizers** derived from plant and animal residue. Using nitrogen from organic sources is almost always more expensive because generally organic fertilizer sources have lower amounts of nutrients in complex forms that are not immediately available to plants. Warm (higher than 55°F), moist soil for microbial activity is needed to release nutrients so they are suited for summer applications.

Topdressing (applying a thin layer less than ¼” on top of the grass) of an organic soil amendment can improve soil structure and contribute to the overall health of the soil after many years of use.

Many sources of commercial produced organic lawn fertilizers are available. Pay attention to their analysis when trying to match the soil test recommendation to a locally available source.

Use **Table B** to determine the amount of product to apply per 1,000 sq. ft. based on nitrogen content.

Table B: Some nitrogen (N) sources and application amounts				
Examples of common nitrogen sources	% Nitrogen content	Amount of this fertilizer needed to supply 1 lb. of nitrogen per 1,000 sq. ft.	Residual Effect	Other facts
Ammonium Sulfate (inorganic)	21%	4.5 lbs.	Short	Do not apply when temperature is over 80° or high humidity
Corn Gluten (natural organic)	10%	10 lbs.	Moderate	Can be used in the spring for annual grass control
Natural organics	3%	33 lbs.	Long	By-products from plant and animal processing
	10%	10 lbs.		
Sulfur Coated Urea (inorganic)	32%	3 lbs.	Moderate	Also provides sulfur
	38%	2.5 lbs.		
Urea (synthetic organic)	46%	2 lbs.	Short	Do not apply when temperature is over 80° or high humidity

Calculate how much water soluble or slow release nitrogen you need for your lawn.

Read the fertilizer label to determine the total amount of nitrogen. In this example the fertilizer analysis is **30-5-10**, which means it contains 30% nitrogen. It is easy to figure out how much of the nitrogen is *water soluble* (quickly available) and how much is *slow release*.

30-5-10 Lawn Fertilizer	
Total Nitrogen	30%
WIN 15%	
Available Phosphorus	5%
Water Soluble Potash	10%

First, look on the label for the language “slowly available nitrogen” or

“Water Insoluble Nitrogen” (**WIN**), or something similar. In this example, the water insoluble nitrogen is 15%.

To determine the % slow release nitrogen, divide the **WIN** (%) by the total nitrogen. In this example, **half of the total nitrogen is slow release**.

WIN on label = Water Insoluble Nitrogen	
% total nitrogen	
15% (WIN) = 50% slow release nitrogen	
30% total N	

Calculating how much nitrogen fertilizer you need for your lawn.

If you have decided to make a fertilizer application at the $\frac{3}{4}$ lb. nitrogen rate per 1,000 square feet (sq. ft.) and your lawn is 5,000 square feet (sq. ft.), how much will you need to take care of your entire lawn? It all depends on the **nitrogen analysis** of the product you are using. Let us consider two examples. **Urea Fertilizer** with an analysis of 46-0-0 (contains 46% N) and **Corn Gluten Meal** with an analysis of 10-0-0 (contains 10%N).

The percent (%) of N in urea (46-0-0) is determined by dividing the analysis by 100 (i.e. $46/100 = .46$). Similarly, the percent (%) of N in corn gluten meal is determined by dividing the analysis by 100 (i.e. $10/100 = .10$).

Using **Table C**, we learn that if we use a fertilizer with 45% nitrogen, **1.7 lbs.** for each 1,000 sq. ft. of lawn area will be needed to supply nitrogen at the $\frac{3}{4}$ lb. rate per 1,000 sq. ft. For a 5,000 sq. ft. lawn **8.5 lbs.** of 46-0-0 will be needed to do the whole job. A 10 lb. bag of **Urea Fertilizer** is all you would need.

If you use **Corn Gluten Meal**, an organic source with 10% nitrogen (10-0-0), you will need to apply **7½ lbs.** for each 1,000 sq. ft. or **37½ lbs.** to do your whole lawn to supply nitrogen at the $\frac{3}{4}$ lb. per 1,000 sq. ft.rate. If using **Corn Gluten Meal** you will need a 40 lb. bag.

% Nitrogen in fertilizer (printed on the bag)	To provide nitrogen at the rate of		
	½ lb.	¾ lb.	1 lb.
5	10.0	15.0	20.0
8	6.25	9.4	12.5
10	5.0	7.5	10.0
20	2.5	3.75	5.0
25	2.0	3.0	4.0
30	1.7	2.5	3.4
35	1.4	2.1	2.9
40	1.25	1.9	2.5
45	1.1	1.7	2.2

Never apply more than 1 pound (lb.) of nitrogen per 1,000 square feet (sq. ft.) per application.

Phosphorus (P)

Phosphorus (P) is known to stimulate root growth at seeding and can promote seedling vigor.

Phosphorus does not move in the soil very much so it is best to incorporate P into the soil before planting so the roots can access more of this nutrient. Many of our soils in New York have adequate or high levels of P already. There will be no benefit to adding P if levels are sufficient.

Commonly available phosphorus sources include: natural organics with varying amounts of P and superphosphate with 16-21% available phosphate (P_2O_5), triple superphosphate with 40-47% available phosphate and the ammonium phosphates with 46-53% available phosphate.

If you planned to use triple superphosphate (47% P_2O_5) at the rate of 1 lb. per 1,000 sq. ft. you would need ~2 lbs. of triple superphosphate for each 1,000 sq. ft.

1 lb. of P_2O_5 (recommended amount) = ~2 lbs. will be needed for each 1,000 sq. ft.
0.47 (percent P_2O_5 in triple superphosphate)

Phosphorus runoff from lawns can contribute to algae blooms and reduce levels of oxygen in water, killing fish. **The New York State 2010 Nutrient Runoff Law** restricting the use of lawn fertilizer containing phosphorus is aimed at reducing the amount of phosphorus that makes its way to lakes and streams through runoff. Fertilizers containing more than 0.67% phosphate (P_2O_5) can be used on lawns **ONLY if** establishing a new lawn or if a soil test indicates it is needed on established lawns.

Compost: Too much phosphorus?

While compost can improve soils, many are high in phosphorus, difficult to apply at low rates and can wash off into water as easily as fertilizers. Depending on the source, compost additions may increase phosphorus levels far beyond what the grass needs and exceed levels considered a threat to water quality.

Potassium (K)

Potassium (K) regulates water use efficiency, improves stress tolerance and does not produce excess clippings.

Commonly available potassium sources include: muriate of potash (KCl) with 60-63% available potash or sulfate of potash with 50-53% available potash.

If only one nutrient is needed it is easy to calculate the amount of fertilizer to apply.

For example, if the recommended potassium rate is 2 pounds of potash (K_2O) for each 1,000 square feet and potassium chloride (0-0-**60**) will be used, you will need to apply about 3.3 lbs. of that particular potassium source for each 1,000 square foot area to provide the potassium at recommended rate.

Let us walk through the process on how we got to that amount. The recommended amount to apply is 2 pound of potash (K_2O) per 1,000 sq. ft. The percent potash (K_2O) in potassium chloride is 60, (0-0-**60**).

The actual percent is determined by dividing the analysis by 100 (i.e. $60/100 = 0.60$). The next step is to then divide the recommended rate by the % fertilizer analysis to come up with the amount to apply (3.3 lbs.).

See example:

$$\frac{2 \text{ lbs. of } K_2O \text{ (recommended amount)}}{0.60 \text{ (percent } P_2O_5 \text{ in potassium chloride)}} = 3.3 \text{ lbs. will be needed for each 1,000 sq. ft.}$$

For more information on the establishment and maintenance of your lawn Visit [Lawn Care: The Easiest Steps to an Attractive Environmental Asset](#):

<http://turf.cals.cornell.edu/lawn/lawn-care-the-easiest-steps-to-an-attractive-environmental-asset/>