

## Fertilizing the Home Lawn

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### Introduction

An attractive, stress tolerant lawn requires an adequate supply and balance of essential plant nutrients and a slightly acid soil pH. Adequate supplies of the macronutrients (N, P, K, Ca, Mg, and S) and micronutrients (B, Cl, Cu, Fe, Mn, Mo, Ni, and Zn) must be available in the soil to support turfgrass growth. Turfgrasses are most responsive to nitrogen which promotes vigorous shoot growth and enhances green color. An established lawn's requirements for phosphorous, potassium and lime should be based on a soil fertility test. A soil test has not been developed to measure the need for nitrogen in turfgrass. Nitrogen fertilizer is almost always needed because there are few soils able to supply enough nitrogen throughout the growing season to provide a healthy, attractive turf that inhibits weed invasion.

### Nitrogen

Turfgrass nitrogen requirements are based on many factors including species of grass, soil texture, air and soil temperatures, clipping removal, amount of rainfall, irrigation level, and the general maintenance and aesthetic level desired by the grower. Nitrogen fertilizer rates and application times suggested for lawns in New Jersey are shown in Table 1. The amount of nitrogen needed to maintain a desired quality and vigor of turfgrass is largely determined by the species of grass and the desired level of care given to the lawn. Highly maintained turfgrasses require more nitrogen and more frequent fertilizer applications than lower maintenance lawns. A lawn's nitrogen requirements can be reduced by 50% when the clippings are returned to the lawn. Mowing frequencies that produce fine clippings

**Table 1.** Suggested Annual Nitrogen Fertilizer Applications for Lawns in New Jersey

Maintenance Practices	Nitrogen to apply lbs. N/1000 sq. ft.	Timing of Applications*						
		April	May	June	Sept.	Oct.	Nov.	
<u>High Maintenance Lawn</u>								
Kentucky bluegrasses, perennial ryegrasses Irrigation, clippings removed	4-5	0.5	0.5	0.5-1	1	1	0.5-1	
Irrigation, clippings not removed	2-3	0.5	0.5	0.5	0.5-1	0.5	0.5-1	
<u>Low Maintenance Lawn</u>								
Tall fescues, Fine fescues	2-3	0.5			0.5-1	1-1.5		
No irrigation, clippings not removed	1-2	0.5			0.5-1			

\*Apply no more than 1 lb. N/1000 sq. ft. at each of application using a soluble quick release source of nitrogen.



which will filter through the lawn to the soil will increase the availability of the nitrogen provided by the clippings. Watering practices, weather conditions, and soil texture affect a lawn’s need for nitrogen and frequency of fertilization. Excessively irrigated lawns where clippings are removed may require greater nitrogen fertilizer annually due to nitrogen losses. On sandy to sandy loam soils, lower, more frequent rates of soluble nitrogen fertilizers can be used to reduce the potential for nitrogen losses due to leaching. Even on finer-textured soils, more frequent applications of a soluble nitrogen fertilizer may give a more even turfgrass response and growth. Reducing the applications of soluble nitrogen to 0.25 to 0.5 lb N/1000 sq. ft. per application helps to minimize the possibility of leaching nitrogen below the root zone.

Timing of fertilizer applications is very important in maintaining a quality turf. Most of the annual nitrogen applications should be spread in the late summer and fall to promote rhizome development. Some nitrogen can be applied in the spring to promote early growth and lawn “green up.” Avoid applying nitrogen during the hot summer months when cool-season grass species are in a slow growth phase due to temperature and moisture stress.

Slow release types of fertilizers should be applied less frequently than soluble nitrogen sources. Slow release fertilizer provides a more gradual supply of nitrogen over a period of weeks or months. The cost per pound of nitrogen may be considerably more than for water soluble fertilizers. However, the convenience of less frequent fertilizer applications, freedom from salt injury, less potential from leaching, and surge growth from slow release nitrogen may be a reasonable trade-off.

### Soil Fertility Tests

A lawn’s need for phosphorus, potassium and lime varies widely depending on previous lime and fertilizer practices, clipping removal, and soil type. A recent survey of soil test results from New Jersey home lawns indicates that some lawns are receiving more phosphorus and lime than is desirable for optimum health and growth of turfgrass. A soil test is essential to the proper use of fertilizers and lime. A soil test indicates the degree of acidity or alkalinity (pH) of a soil, which nutrients are present in adequate supply, and which are deficient. Application of fertilizers and soil amendments without this information can harm plants and may be wasteful and pose a hazard to water quality when overapplied.

**Table 2.** Suggested Annual Phosphate and Potash Applications for Lawns.

Soil Test Level	Low Maintenance Lawn		High Maintenance Lawn	
	Phosphate to apply	Potash to apply	Phosphate to apply	Potash to apply
	lbs. P <sub>2</sub> O <sub>5</sub> /1000 sq. ft.	lbs. K <sub>2</sub> O/1000 sq. ft.	lbs. P <sub>2</sub> O <sub>5</sub> /1000 sq. ft.	lbs. K <sub>2</sub> O/1000 sq. ft.
Very low	3	4	4	5
Low	2	3	3	4
Medium	1	2	2	3
High	0	1	1	2
Very High	0	0	0	1

## Taking a Soil Sample

A soil testing service is provided to New Jersey residents through the County Cooperative Extension offices (listed in the telephone book as Rutgers Cooperative Extension under County Government) for a nominal charge. This service provides soil sample tests kits, soil test results and recommendations for growers throughout New Jersey. Also visit our web site, [www.rce.rutgers.edu/soiltestinglab](http://www.rce.rutgers.edu/soiltestinglab).

Ideally, the best time to take a soil sample is before spring or fall fertilization. Do not sample shortly after a lime or fertilizer application or when the soil is excessively wet.

Taking a good soil sample is the most important step in soil testing. The soil test can only provide useful information when the sample accurately represents the fertility in a lawn soil. Sample the top three inches of soil while walking in a random pattern across the entire lawn. Collect 10 to 15 cores of soil in a clean plastic bucket using a garden trowel or a spade. Break-up the clumps and thoroughly mix the soil. Place about a half pound subsample into the soil sample test kit. Follow the instructions that came with the soil sample test kit. (Vegetable and flower gardens should be sampled separately from the lawn.)

## Phosphorus and Potassium

The amounts of phosphorus and potassium to apply to a lawn depend on the results of the soil test. Once the soil test levels are known, a new soil test should be conducted every three years to follow changes in soil conditions. When a soil fertility test level is low for phosphorus or potassium, annual applications of the deficient nutrient may be expected to improve turf quality. Once soil fertility levels have been built-up to high or very high soil test levels, annual applications of the nutrient are not likely to improve turf quality. Avoid annual applications of phosphorus to established lawns when soil test phosphorus levels are very high or until a need for phosphorus is indicated by a future soil test. Suggested annual phosphate and potash applications for home lawns based on various example soil test results are given in Table 2.

## Fertilizer Grades

Fertilizer can be purchased as a single nutrient fertilizer or combination fertilizer. The numbers on the fertilizer bag represent a grade (analysis) of fertilizer or percentage of nitrogen (N), phosphate ( $P_2O_5$ ) and potash ( $K_2O$ ). Popular combination fertilizers for turf might be 15-5-10 or 16-4-8. The

**Table 3.** Examples of Fertilizer Selections Based on Soil Test.

Annual N	Application		Ratio	Possible Fertilizer Analysis	Approximate Amount of Fertilizer Needed Annually
	$P_2O_5$ lbs./1000 sq. ft.	$K_2O$			
4	1	2	4-1-2	16-4-8	25
				20-5-10	20
4	1	1	4-1-1	16-4-4	25
				12-3-3	33
2	1	1	2-1-1	16-8-8	13
				12-6-6	17
3	0	0	1-0-0	33-0-0	9
				45-0-0	6.7
2	1	0		45-0-0	4.5
				0-46-0	2.2
2	0	1		45-0-0	4.5
				0-0-60	1.7

above fertilizers would possess 3-1-2 and 4-1-2 nutrient ratios, respectively.

In determining which fertilizer grade one should be used when all three nutrients are needed, the suggestions outlined in Table 2 should be considered. The proper fertilizer can then be selected on the basis of the ratio which most closely resembles the recommended nutrients. Consider a recommendation which calls for four pounds of nitrogen, one pound of phosphate and two pounds of potash per 1000 sq. ft. per year (based on medium level soil test results for phosphate and potash). This gives a ratio of 4-1-2, which should be easily matched by a commercial turf fertilizer. A 20-5-10 fertilizer grade, applied at the rate of 20 pounds per 1000 sq. ft. should be divided into four or more applications per year. Some other examples which can be used as guides are given in Table 3. On small lawns where the ratio does not work out similar to a commercially available fertilizer, a fertilizer which has a similar ratio may be substituted.

On large turf areas it may be practical to use single nutrient fertilizers to make soil fertility adjustments. For example, when the soil test is very high in phosphorus and low in potassium, single nutrient potassium fertilizers may be used to build up the potassium fertility level without adding more phosphorus than is needed. Application of 1.7 pounds of 0-0-60 (potassium chloride or muriate of potash) or two pounds of 0-0-50 (potassium sulfate or sulfate of potash) would provide one pound of K<sub>2</sub>O per 1000 sq. ft. Single nutrient fertilizers may not be available from small garden centers, but can be obtained from farm supply stores.

## Lime

Generally, the soils of New Jersey are naturally acidic (low soil pH). Application of lime on low pH soils will raise the pH and enhance the availability of essential plant nutrients, supply Ca and Mg for plant use, reduce the toxicity of substances in soil that restrict root growth, improve soil structure, and enhance the growth of beneficial soil microorganisms. A slightly acid soil, with a pH near 6.5, is optimum for most lawns and the soil microorganisms that recycle clippings. Raising the soil pH above 6.5 has no benefit, and in some instances, can be detrimental. Soils with different textures, but the same initial pH value, usually require different rates of lime application. For example, a sandy loam soil with a pH of 5.5 may need 65 lbs. of lime for 1000 sq. ft., whereas a silt loam soil may need 150 lbs. of lime. Soil pH will decrease (become more acidic) over time. Most nitrogen fertilizers used on lawns contribute to soil acidification. Applying the recommended rate of lime will maintain the soil pH within the desired range for 2-3 years on sandy soils and 3-4 years on finer textured soils. Soils that test low in magnesium should receive dolomitic lime which has a higher magnesium content than calcitic lime. Annual applications of lime may be excessive and can decrease the availability of soil nutrients and increase the severity of root-infecting turf diseases. Deficiencies of iron, manganese and zinc may occur in turfgrasses with an excessively high soil pH. For further information on liming see fact sheet, FS635, "*Managing Soil pH for Turfgrass.*"

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