



Lawn Fertilization

Reasons for Fertilization

Lawns are an important component of many home landscapes. Good cultural practices are necessary to achieve a healthy, attractive lawn. One important cultural practice is fertilization. The benefits of a well-maintained lawn fertilization program are good turf color, quality and density. There are 14 elements which are often referred to as mineral nutrient elements and are generally obtaining in the soil via root extraction. The quantity of most of these nutrients contained in the soil is high compared with the requirements of turfgrass plants. However the demands for nitrogen, phosphorus, and potassium often exceed the supply in the soil. Thus, it becomes necessary to add these elements through fertilization.

Turfgrasses require nitrogen (N) in the largest amount of any of the essential nutrients. For this reason, nitrogen is usually applied in the largest amounts. Nitrogen nutrition is important to turfgrasses because it can affect shoot growth and density, root growth, and susceptibility to damage from disease, heat, cold, and drought.

Turfgrasses require potassium (K) in relatively large amounts, second only to nitrogen. Potassium influences turfgrass rooting, disease susceptibility and drought, heat, and cold hardiness. The terms soluble potash, soluble potassium and K_2O may be used to refer to potassium fertilization.

Phosphorus (P) is required by turfgrass plants in smaller amounts than nitrogen and potassium. Phosphorus is important in the establishment, rooting, maturation, and reproduction of turfgrasses. The terms *available phosphate*, *available phosphorus*, *available phosphoric acid*, and P_2O_5 may be used to refer to phosphorus fertilization.

If sufficient phosphorus and potassium are available in the soil, it is not necessary to apply additional amounts. The best means of determining the fertilizer requirements for an area is to have the soil tested. Soil tests provide valuable information on the phosphorus and potassium requirements of a soil at a nominal cost. Many soils in Iowa have a high pH. Turfgrass grown on these alkaline soils may show iron chlorosis, or yellowing. A soil test can help determine if an area requires iron. Soils can be tested at Iowa State University's Soil and Plant Analysis Laboratory. Information can be found at www.extension.iastate.edu/publications/ST11.pdf.

Iowa's Fertilizer Label Requirements

Fertilizer companies are required by law to list on a fertilizer bag the amounts of elements contained in the fertilizer. This is referred to as a guaranteed analysis. Also listed on the bag is the fertilizer grade. A fertilizer grade designates the percentage of nitrogen, available phosphate, and water soluble potash in the product. A 10-6-4 grade fertilizer contains 10 percent nitrogen, 6 percent available phosphate (P_2O_5), and 4 percent water soluble potash (K_2O). Thus, a 40 pound bag of 10-6-4 contains 4 pounds of nitrogen (10 percent of 40), 2.4 pounds of (P_2O_5) (6 percent of 40), and 1.6 pounds of (K_2O) (4 percent of 40).

Fertilizer recommendations are often made using fertilizer ratios. A fertilizer ratio refers to the relationship between the percentages of nitrogen, phosphate, and potash. A 16-8-8 grade fertilizer contains twice as much nitrogen as phosphate or potash. Thus, it would have a 2-1-1 ratio. Analyses of 10-5-5 and 20-10-10 also have 2-1-1 ratios. An analysis of 20-5-10 would have a 4-1-2 ratio. The easiest way to determine ratio is to divide each number in the grade by the smallest number in the grade, or by the highest whole number divisible into all three numbers of the grade.

A turf grade fertilizer is normally defined as a complete fertilizer (contains nitrogen, phosphate, and potash) having an approximate 2-1-1 or 3-1-2 ratio, and having at least 35 percent of the total nitrogen as water insoluble nitrogen (WIN). Water insoluble nitrogen is not immediately available to the plant. Instead, the nitrogen is released slowly over relatively long periods of time. Fertilizers with at least 35 percent WIN can be applied at higher rates than farm grade fertilizers (water soluble) with little risk of burning the turf. Farm grade fertilizers have a greater chance of causing fertilizer burn, but if they are applied at recommendation rates and watered-in after application, they work great for turf. A fertilizer bag may have the following label:

20-5-10
Guaranteed Analysis
Total Nitrogen 20%
Water Insoluble Nitrogen 8%
Available Phosphate 5%
Water Soluble Potash 10%

Types of Nitrogen Fertilizers

The ideal fertilizer program provides uniform growth throughout the growing season. The development of a sound fertility program based on the source of nitrogen is important in moving toward this ideal. Nitrogen sources are commonly classified into two broad groups, quickly available (water soluble) and slow-release or controlled release fertilizers (water insoluble).

Quickly available nitrogen sources include urea, ammonium sulfate, diammonium phosphate, and others. These materials are water soluble, and nearly 100 percent of their nutrient content is immediately available for plant uptake. Fertilization with soluble nitrogen sources results in a flush of growth and rapid depletion of available nitrogen. Thus, it is necessary to make several light applications of these materials to obtain uniform growth over a long period of time. Soluble nitrogen sources are less expensive per pound of nitrogen than the slow-release fertilizers.

Slow-release fertilizers include natural organics, synthetic organics, and coated nitrogen materials. The release of nitrogen from these materials may be due to microbial decomposition alone, or in combination with chemical and physical processes. Since the activity of microorganisms is dependent on soil temperature and moisture, nitrogen availability from slow-release fertilizers may vary with the time of the year and weather.

Natural organic fertilizers include activated sewage sludges, manures, plant by products, and others. These materials are more expensive per unit of nitrogen than other nitrogen sources, and they have a low nitrogen analysis. Since the release of nitrogen is due to microbial decomposition, nitrogen availability is low in cool or dry months. One advantage to the use of natural organics from sludges and manures is the addition of several micronutrients.

Many fertilizers contain both slow-release and soluble nitrogen in the same formulation. Such fertilizers would have the advantage of containing quickly available nitrogen, as well as the long-term benefits of slow-release nitrogen.

In addition to nitrogen, there are several phosphorus and potassium fertilizer options in the market. Most soils in Iowa contain adequate amounts of phosphorus and no additional phosphorus should be supplied in a fertilizer program. Regulations in Minnesota and Wisconsin restrict the application of phosphorus to lawns. While there are no phosphorus restrictions in Iowa, phosphorus should only be applied when a soil test has indicated a need for additional amounts.

Fertilization Amounts and Timing

Again it must be emphasized that use of a soil test to determine fertilizer requirements is the best guide for proper fertilization. The number of applications depends on the desires/expectations of the homeowner, soil type, cultural practices, and other factors. Spring, September and late October/early November (after the grass has stopped growing) are the best times to fertilize lawns in Iowa.

A single application of fertilizer in late October/early November may be sufficient for low maintenance lawns. Highly maintained lawns may be fertilized in the spring, September, and late October/early November. Lower rates are recommended in the spring to avoid over-stimulation of the grass. Over-stimulation of grass may result in increased occurrence of fungal disease known as leafspot. It will also deplete stored food reserves, making the grass more susceptible to heat and drought stress.

When a farm grade (soluble nitrogen) fertilizer is used, apply at a rate of 0.5 to 0.75 pounds of nitrogen in the spring. In late summer and in mid-fall, fertilize at a rate of 0.75 to 1.0 pounds of nitrogen per 1,000 square feet each time. If the fertilizer contains at least 35% WIN, the

late summer and fall application may be combined and applied at a rate of 2 pounds of nitrogen per 1,000 square feet in late summer. See table 1 to determine how much fertilizer to apply to obtain this rate of nitrogen.

Precautions

Most fertilizers are salts, and they will burn grass if improperly applied. Farm grade fertilizers will burn more severely than fertilizers containing WIN. Apply fertilizer only when the grass blades are dry and water thoroughly immediately after application. This will reduce the possibility of burn and limit the volatilization of N from the urea back into the atmosphere. It is generally not advisable to fertilize lawns in June, July, or August.



Table 1. Approximate pounds of material (nearest 0.5 pounds) required to supply rate of nitrogen recommended.

Pounds of nitrogen recommended	Urea 46-0-0	10-5-5 10-6-4	16-6-6	25-3-3	20-3-7 20-5-10	Natural organic 6% N	Sulfur coated urea 38% N
0.5	1	5	3	2	2 ½	*	*
1	2	10	6 ½	4	5	*	*
1.5	3	15	9 ½	6	7 ½	17	4
2	*	20	13	8	10	33 ½	5 ½

* Not recommended at these rates.

For more information

Horticultural information is available from your local Iowa State University Extension and Outreach office and these websites.

www.yardandgarden.extension.iastate.edu/
<https://store.extension.iastate.edu/>

Revised by Ryan Adams, extension turfgrass specialist and Nick Christians, professor of horticulture. Previously revised by Dave Minner, professor of horticulture. Prepared by Norm Hummel, former extension turfgrass specialist; reviewed by Michael L. Agnew, extension turfgrass specialist.

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