



Fertilizing Trees and Shrubs

Why fertilize?

Many trees and shrubs in the home landscape receive adequate nutrients from the soil, decomposing leaf and twig litter, or from lawn fertilizers routinely applied around them. Mature trees in a natural environment seldom require fertilizer due to their extensive root systems and symbiotic relationships with naturally occurring soil microorganisms. As long as a tree or shrub appears healthy and is growing at an acceptable rate there is no need to give it any additional fertilizer.

Competing shrubs and trees in landscape beds often benefit from fertilization. Established plants that are putting on very little new growth each year or whose leaves are small and light in color will probably respond to nitrogen fertilizer. Older leaves that are purplish or yellow in color may indicate phosphorous deficiency, while areas of dead tissue along the leaf edges may be a symptom of potassium deficiency.

Nitrogen is the fertilizer nutrient that plants use in the largest amount; fertilizing with nitrogen causes plants to green up and increase growth rate. It is less likely that plants will respond to phosphorus or potassium fertilization. Soil tests will determine whether soil phosphorus and potassium levels are adequate. Unfortunately, there is no useful test for soil nitrogen.

Deficiencies of minor nutrients such as iron, magnesium or manganese occur occasionally and can be diagnosed by symptoms and/or by leaf tissue analysis. For help identifying minor nutrient deficiencies, call UNH Cooperative Extension's Family, Home & Garden Education Center toll free at **1-877-398-4769**.

Problems caused by planting too deep, over-watering, drought, disease or mechanical damage may cause symptoms similar to nutrient deficiencies. Fertilizer applications will not correct any of these problems.

When to apply fertilizers

Apply fertilizer in early spring or in autumn after shoot growth ceases, as root growth and maximum nutrient uptake occurs during these periods. Plants take in few nutrients during periods of active shoot growth.

Do not fertilize plants showing symptoms of drought stress. Do not fertilize a tree or shrub *during* a drought unless plantings are irrigated frequently. Plants can not use the fertilizer without adequate water. Some fertilizers may also damage the roots and scorch the leaves if water is lacking.

No soluble fertilizer should be applied to trees or shrubs in their first growing season in the landscape. However, soil testing before planting will determine the need for lime to adjust the

pH, which is most effectively applied before planting. If soil tests determine a need for phosphorus, incorporate it into the bed or backfill at planting time.

Do not apply fertilizer indiscriminately. Excess nitrogen can leach through soils and pollute ground water. Phosphorus fertilizer particles washed by rainfall into lakes or streams contribute to growth of algae and have other biological effects. In addition, the effects of diseases, insects or environmental stresses can be more severe on heavily-fertilized plants.

Managing soil pH

Unamended New England soils commonly range in pH from 4.5 to 5.5. A standard soil test will determine a soil's pH level and suggest the amendments needed to raise or lower pH to provide the optimum environment for trees and shrubs growing there.

Rhododendrons and other broadleaf evergreens do best within a pH range of 4.5 to 5.2. Red maples, oaks, junipers and most conifers (pines, firs and hemlocks) prefer a pH from 5.5 to 6.0. Yews, arborvitae and most deciduous trees and shrubs do well between 6.0 and 7.0 (with the exception of viburnums, hydrangeas and lilacs, which grow best at a pH of 7.0 or slightly above).

Incorporating 5-10 lbs of ground limestone per 100 square feet of area will generally raise the pH $\frac{1}{2}$ to 1.0 unit. It is best to incorporate lime into the soil to a depth of 6 inches before planting, since surface applications are slow to change pH levels. Wood ashes from household stoves will also raise pH; use twice as much wood ash by weight as the recommendation for limestone. Do not over-apply as wood ash is highly soluble and raises pH much more rapidly than limestone. Do not use ashes from coal stoves; coal ash contains elements toxic to plants.

If necessary, lower pH 1 unit by incorporating 1.5 lbs of sulfur per 100 square feet. Do not apply higher amounts to avoid burning plant roots.

What fertilizers to use

Complete fertilizers contain the major plant nutrients: nitrogen (N), phosphorus (as phosphoric acid, P_2O_5) and potassium (as potash, K_2O) and are commonly used in home landscapes because they are inexpensive and readily available. Generally, nitrogen is the only nutrient needed and may be applied as a single-source fertilizer such as ammonium nitrate or calcium nitrate.

Fertilizer labels identify the percentages of N, P and K respectively, as a set of three numbers, e.g., 15-5-10. This is called the fertilizer *grade* or *analysis*. In this example, the fertilizer contains 15 percent N, 5 percent P_2O_5 , and 10 percent K_2O by weight. When a complete fertilizer is used on woody plants, the **ratio** of N: P_2O_5 : K_2O should be approximately 3-1-2 or 3-1-1. Examples of fertilizer grades with these ratios include 24-8-16, 15-5-10, and 15-5-5.

The sources of the nutrients are identified on the fertilizer label. Synthetic, soluble sources of nitrogen include materials such as ammonium nitrate, ammonium sulfate and urea. They are low in cost and are rapidly available to the plant, producing a quick growth and green-up response, but they do not last long in the soil environment. Over-application of soluble fertilizers may burn plants.

A better choice for home landscapes is one of the slow-release fertilizers. The nitrogen in these fertilizers is treated in a way that it is released slowly over a long period of time. Common slow-release nitrogen sources include sulfur-coated urea (SCU), isobutizidene diurea (IBDU) and materials which are plastic- or resin- coated.

Look carefully at the fertilizer bag or label to see how much slow-release nitrogen it contains. Choose a slow-release fertilizer that contains at least fifty percent slow-release or “water-insoluble nitrogen.” Slow-release fertilizers are more expensive than soluble sources but will provide a consistent supply of nitrogen to the plant throughout the growing season. Chances of overdosing or burning plants with slow-release fertilizer are very low. Slow-release fertilizers are also considered environmentally-friendly since only small amounts of nitrogen are released at a time. Most slow-release fertilizers that are available in the marketplace are complete fertilizers.

Organic materials such as compost, manures, and sewage sludge are natural slow-release sources of nutrients. Because they contain a low percentage of nitrogen they must be used in relatively large quantities to supply the desired levels of nutrients. Animal manure varies in its nutrient content but typically contains less than one percent of each nutrient.

Recycling organic matter in your own landscape is an excellent way to avoid nutrient deficiencies and keep yard waste on site. It has been estimated that leaves which fall from a tree and decompose in place recycle at least a pound of nitrogen per 1000 square feet of surface area. If you prefer to rake up leaves and trimmings, shred and compost them and apply the compost next year as mulch to the planted areas.

A number of “special” fertilizers on the market have been developed for certain uses, such as rose fertilizer or azalea fertilizer. Use the same criteria to evaluate these fertilizers as discussed above. The acid-forming fertilizers are useful for maintaining an acid soil pH for acid-loving plants such as azaleas, rhododendrons, camellias, mountain laurel, pieris, hollies and leucothoes. However, long term use of these fertilizers may actually make the soil too acidic, so check the pH at least once every few years.

How much to apply

The amount of fertilizer to apply is based on the area of the plant bed or calculated root zone of the plants or trees. For landscape beds, roughly calculate the area to be fertilized by using these formulas:

- *square or rectangular areas* *length in feet x width in feet = area in square feet*
- *circular areas* *the radius of the circle (in feet) times itself, times 3.14 = area in square feet*
- *half circular areas* *½ times the radius (in feet) times itself, x 3.14 = area in square feet*
- *triangular areas* *½ times the length in feet x maximum width in feet = area in square feet*

Most landscape beds can be visualized as some combination of these geometric shapes. Add them together to get the total square feet of area to be fertilized.

For individual trees, fertilize an area up to one and one half times the canopy diameter. (A tree’s *canopy* is the area within the tips of its branches.) If the tree is bordered by a recently-fertilized lawn, to avoid overfeeding the lawn, do not apply fertilizer to the grass; instead, measure and fertilize only the mulched or bare area under the tree. After several years of growth in the landscape, trees will not need fertilizer unless symptoms of nutrient deficiencies develop.

Apply one to three pounds of *actual nitrogen* (see explanation below) per 1000 square feet of surface area to be fertilized. Rhododendrons, azaleas and other plants with very shallow root

systems should be fertilized at the low rate. Plants that tend to put on excessive growth such as forsythia, honeysuckle, privet, willow, Siberian elm and silver maple require little or no nitrogen fertilization. To promote moderate growth of other established trees and shrubs use two pounds. Use rates higher than two pounds, *from slow-release nitrogen sources only*, when rapid growth rates are desirable.

To calculate the amount of a particular fertilizer that will provide one pound of actual nitrogen, divide the percent nitrogen listed on the bag into 100. For example, a 15-5-10 fertilizer contains 15% nitrogen. Fifteen into 100 equals 6.6, therefore, apply 6.6 (rounded off to 6.5) pounds of this fertilizer per 1000 square feet. Twice as much, or 13 pounds, would be required to provide two pounds of nitrogen per 1000 square feet.

How to apply fertilizer

The simplest and fastest way to fertilize trees and shrubs is to broadcast granular fertilizer evenly over the bed or root zone. Subsurface applications of dry or liquid fertilizer are no more effective than broadcast methods in most circumstances, but can help prevent fertilizer runoff from a steep slope. Fertilizer stakes or spikes are expensive and inefficient ways to fertilize.

Minor element deficiencies may also be corrected by spraying liquid fertilizer on the leaves, a practice called *foliar feeding*. This is not an effective practice for nitrogen or phosphorus fertilization, but can be used to provide iron, manganese or other minor nutrients directly to the leaves. A long-term solution to the problem would require correction of underlying site problems, soil pH adjustment and/or soil applications of the deficient nutrients.

written by Catherine A. Neal, UNH Cooperative Extension Ornamentals Specialist, 5/00

Visit our website: ceinfo.unh.edu

UNH Cooperative Extension programs and policies are consistent with pertinent Federal and State laws and regulations on non-discrimination regarding age, color, handicap, national origin, race, religion, sex, sexual orientation, or veterans status.