



Fertilizing Landscape Trees and Shrubs

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Maintenance programs should be developed for trees and shrubs in both residential and commercial landscapes. A good maintenance program includes monitoring and controlling insect and disease problems, suppressing weed competition, and making timely applications of water, mulch, and fertilizer.

Tree and shrub fertilization is especially important in urban and suburban areas of Virginia where soils have been altered due to construction. These urban soils tend to be heavily compacted, poorly aerated, poorly drained, and low in organic matter. Even where soils have not been affected, fertilization may be needed as part of a maintenance program to increase plant vigor or to improve root or top growth.

Fertilizer Objectives

How and when to fertilize landscape trees and shrubs depends on:

- Maintenance objectives (stimulate new vs. maintain existing growth)

- Tree and shrub ages (generally more for younger and less for older plants)
- Plant stress levels

Determining the Need to Fertilize

Visual inspection of trees and shrubs is often the best overall factor to use in making fertilization decisions. Look for:

- Poor or chlorotic leaf color (pale green to yellow)
- Reduced leaf size and retention
- Premature fall coloration and leaf drop
- Reduced twig and branch growth and retention
- Overall reduced plant growth and vigor

In addition to observing signs of possible nutrient deficiencies on plants, soil and foliar analysis can be used to help determine or confirm whether supplemental fertilization is needed.

Chemical fertilizers, analysis, speed of reaction and effect on soil pH.

Fertilizer	Analysis	Speed of Reaction and Leaching	Soil Reaction	#'s of each fertilizer to use to get roughly 1#N/1000ft ²
Ammonium nitrate	33-0-0	Rapid	Acidic	3
Ammonium sulfate	20-0-0	Rapid	Very acidic	5
Urea	46-0-0	Rapid	Slightly acidic	2
Ureaformaldehyde	38-0-0	Slow	Slightly acidic	2 1/2
Di-ammonium phosphate	18-46-0	Rapid	Acidic	5 1/2
Calcium nitrate	15-0-0	Rapid	Alkaline	6 1/2
Potassium nitrate	13-0-44	Rapid	Neutral	7 1/2
10-10-10	10-10-10	Rapid	Varies with N source	10
Osmocote	18-6-12	Slow	Acidic	5 1/2

Fertilizer Selection

A variety of fertilizer types exist:

- Complete (N-P-K) vs. incomplete (one or more select nutrients)
- Organic vs. inorganic
- Fast release vs. slow release
- Dry (granulated, pelletized, spikes, pulverized, encapsulated) vs. liquid

To help determine the type of fertilizer to apply, consider the following: type of plant, time of year, desired rate of plant reaction, application methods and equipment cost, proximity to water sources, effect of soil type and pH, type of deficiency, and results of a soil test or other sampling method.

Most landscape plants benefit from a slow release nitrogen fertilizer that may be organic or inorganic. Keep in mind that nitrogen is readily leached (washed through soil) but phosphorus and potassium are not, meaning they require less frequent application. In Virginia soils, secondary and minor nutrient deficiencies are rare, with the exception of iron.

Application Methods

Fertilizers can be applied either directly or indirectly to plants. When turf is fertilized, tree and shrub roots that extend into the turf area absorb some of the fertilizer, and are therefore indirectly fertilized. Turf fertilization rates should be supplemented only if trees and shrubs are showing symptoms of nutrient deficiency.

Direct application of fertilizer may involve incorporation into the backfill soil or placement in the planting hole at planting time. However, the most common form of direct fertilizer application, broadcasting, is generally the most effective, especially relative to cost. Simply broadcasting the desired fertilizer over the soil atop the tree and shrub roots and watering it in is usually adequate.

Compacted soil should first be aerated or raked. The chart below describes other direct application methods.

Fertilizer Placement

Fertilizer should not be concentrated around the stem or trunk of a tree or shrub, but should be applied over as much of the plant's root zone as possible. For trees and shrubs, fertilizer should be applied over an area twice as large as the crown spread or dripline. Since most landscape plant roots grow in the top foot of soil, surface or shallow, but not deep application, is recommended.

Factors Affecting Fertilizer Uptake

Numerous factors affect how easily and well trees and shrubs absorb fertilizers. The most important uptake factors are:

- Fertilizer form (inorganic, fast release, or liquid forms are absorbed faster than organic, slow-release, or dry forms)
- Soil type (clay particles and organic matter adsorb or bind more nutrients than sand, so fertilizer application needs to be more frequent in sandy soils, but with lower rates each time due to leaching potential)
- Soil moisture content and soil temperature (nutrient uptake is faster in moist warm soils)
- Plant vigor (plants under stress are less able to take up available nutrients due to damaged or reduced root systems)

Fertilizer Rates

Fertilizer use rates should be based on plant type, with younger trees and shrubs generally receiving higher rates (of N) than mature plants. Fertilizer rates for trees are no longer based on trunk size or caliper, but on root system spread, calculated by doubling the area of crown coverage (crown coverage = $3.14 \times \text{radius}^2$).

Application Method	Advantages	Disadvantages
Subsurface	Aerates soil Convenient	Special fertilizer and drilling or soil injection equipment needed
Foliar sprays	Relieves symptoms of micronutrient deficiencies	Temporary benefits; doesn't address underlying soil problem
Injection and implantation	Relieves deficiency symptoms	Temporary benefits; wound creates entry for insects/diseases

In general, use one to six pounds of actual N/1000ft² of root zone. Evergreen shrubs and trees need less (1-3#) while deciduous trees and shrubs commonly need more (3-6#). Reduce the rate when plants are growing in restricted areas (sidewalk cuts, parking lot islands) or where roots of multiple plants overlap.

If applied fertilizer will go over a turf area, do not exceed 1 1/2# N/1000ft² for any one application to avoid overstimulating or burning the grass. Use split applications a few months apart if higher rates are needed. If a soil test shows that P or K is needed, apply at the rate of 1-2# and 1 1/2# N/1000ft², respectively. If a complete fertilizer is used, the ratio of N-P-K should be 3-1-2 or 3-1-1.

Application Timing

Fertilizer should be applied when plants need it, when it will be most effective, and when plants can readily take it up. Late summer and early fall fertilization may stimulate new growth that is not winter hardy, and summer drought may interfere with nutrient uptake, but spring, fall, and winter applications are acceptable. A split application may be beneficial, applying half the yearly rate in early spring and the rest in the fall as or after plants go dormant. **If water is unavailable, do not fertilize at all - plants will be unable to absorb the nutrients.** (During a dry season, fertigation - application of fertilizer through an irrigation system - can be beneficial.)

Summary

Tree and shrub fertilization is only one part of total plant maintenance. Fertilization may not benefit a plant if it is under stress from poor soil aeration or drainage, saturated soil, insufficient light or space, or excessive pest problems. All factors influencing plant growth should be kept at optimum levels to ensure plant vigor.