

# Fertilizing Trees in the Landscape

Tree fertilization is a topic of concern for homeowners and green industry professionals. This publication includes general recommendations for effective and efficient fertilization of trees in the landscape.

Newly transplanted trees as well as older established trees typically need no supplemental fertilization. Trees that may benefit from fertilization frequently display symptoms of reduced annual growth, small leaves or general yellowing of the foliage. If tree growth has slowed in recent years (less than 6 inches per year) and there is no other reasonable explanation or site condition to warrant slow growth, fertilization may be appropriate.

Throughout most of the state, undisturbed soils will have sufficient levels of phosphorus (P) and potassium (K). In these situations, applying additional P and K is not recommended. An inexpensive soil test is the only way to be sure P and K concentrations are adequate. In an urban situation or a construction site where native soil horizons are often disturbed or missing, P and K may be lacking from the root zone. In an unmanaged landscape, nitrogen (N) often will be the nutrient in shortest supply for optimum tree growth and health. But in a landscape where turfgrass is fertilized regularly, the trees in that landscape typically receive sufficient N, and additional applications are not necessary. Excessive fertilization often invites problems such as weak growth and infestation of insect pests such as aphids.

## When to apply

Nutrients are absorbed from the soil by tree roots and need to be available during periods of root growth. Maximum tree root growth occurs in spring during the weeks before budbreak and slows once shoots begin to elongate. A second growth period occurs in late summer after shoot growth and continues into fall until the soil temperature cools. Fertilizers should be applied in early spring before shoot elongation (before and during crabapple bloom) or late fall (just as fall color begins to develop) until leaf drop. Fertilizing in mid to late summer should be avoided because this may stimulate a new flush of growth that will not acclimate properly and be susceptible to a fall freeze.

## Where to apply

For nutrients to be absorbed by the growing roots, fertilizers need to be applied near the root zone. On newly planted trees, this is the edge of the planting hole. As the tree ages,

the effective area for fertilization grows to encompass the area extending to and slightly beyond the outermost branches (see Figure 1). The area to apply fertilizer can be calculated by measuring the distance from the trunk to the outer most branches in feet. Multiply that number by itself, then by 3.14. The result is the area under the canopy in square feet (ft<sup>2</sup>). For the tree in Figure 1 with a canopy diameter of 40 feet, the area to fertilize is: 20 feet × 20 feet × 3.14 = 1,256 square feet.

## How much to apply

There are two approaches to calculating fertilizer rate. One method that is used frequently is based on the diameter of the trunk at 4½ feet above the soil. A common recommendation is to apply ¼ to ½ pound of actual nitrogen per inch of trunk diameter over the root zone. The other frequently used (and preferred) method is based on the size of the root zone area. Using this method, 1 to 2 pound of actual N is applied per 1,000 square feet of root area. Because landscape trees are often grown in a confined root zone, the trunk diameter method could recommend applying a high rate of fertilizer on a relatively small area of soil resulting in fertilizer burn.

## How to apply

Fertilizers can be applied many different ways. If the goal of fertilizing is to apply N, and the surface is not at a severe slope, broadcasting over the surface of the root zone is as effective as any other method and much less labor intensive. Another common method often used by professionals is dispensing granular fertilizer into 1½- to 2-inch wide holes

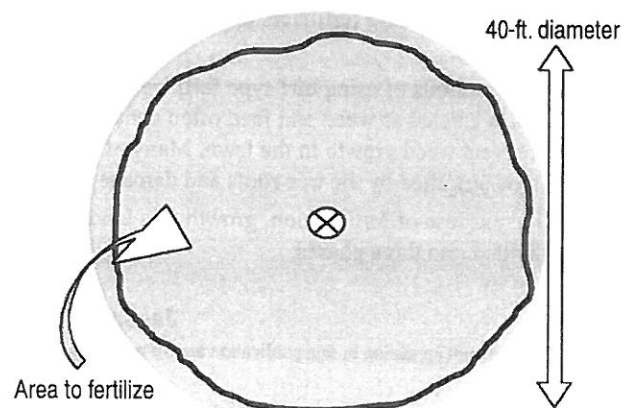


Figure 1. Tree canopy represented by the dark line and the root zone area to apply fertilizer is represented by the shaded area.

Common fertilizers and the amount to apply for 1 pound of actual N per 1,000 square feet of root zone.				
Fertilizer Analysis	Diameter of Tree Root Zone (ft)			
	10	20	30	40
13-13-13	10 oz	2.4 lb	5.5 lb	9.7 lb
18-6-12	7 oz	1.7 lb	4.0 lb	7.0 lb
21-0-0	6 oz	1.5 lb	3.4 lb	6.0 lb
31-0-0	4 oz	1.0 lb	2.3 lb	4.0 lb
46-0-0	3 oz	11 oz	1.5 lb	2.8 lb

throughout the tree root zone. The holes are 4 to 12 inches deep and spaced 12 to 36 inches apart. Using this method the recommended amount of fertilizer is evenly distributed into the holes throughout the root zone. This method is time consuming and is no more effective for N application than broadcasting over the soil surface. The advantages of making holes are when applying P and K or when applying to a slope. P and K do not move through the soil well. The holes place P and K in the root zone. When applying to a slope, the holes prevent runoff that may occur with broadcasting. With the use of special equipment liquid fertilizer also can be used. Typically it will be sprayed into the canopy and absorbed by the leaves, injected into the trunk of the tree, or injected into the soil. These methods are not practical for the homeowner and require the skills of a certified arborist.

## What to apply

Although fertilizers are manufactured in a variety of formulations, this discussion will focus on granular products. Granular fertilizers can be slow release or quick release. For general purpose tree fertilization, slow release is preferred. Slow-release fertilizers supply N to the soil gradually over an extended period of time. Quick-release fertilizers are less expensive than slow release and are perfectly acceptable as long as they are applied correctly. An additional consideration is that quick-release fertilizers need to be watered in soon after application. Slow-release fertilizers do not need to be irrigated after application.

Be very cautious of using turf-type fertilizers. Combination products labeled as weed and feed often contain herbicides to prevent weed growth in the lawn. Many of these herbicides can be absorbed by the tree roots and damage the tree.

For the purpose of fertilization, growth of a landscape tree can be divided into three phases:

1. **Establishment:** a phase where a newly planted tree needs to grow new roots to replace those lost in the transplanting process. These new roots anchor the tree into the surrounding soil and acquire the necessary water and nutrients for growth. A general rule of thumb is that the establishment phase generally lasts one year per inch of caliper.
2. **Growth:** a phase in which an established tree grows vigorously to reach its mature size. The growth phase may last many years depending on species and location.
3. **Maintenance:** a phase where the tree has neared mature size or has reached its functional size in the landscape. This phase typically lasts for the functional life of the tree.

## Fertilizing Your Tree

### Establishment Phase

Fertilizing newly planted trees with a high rate of N encourages vigorous shoot growth at the expense of root growth and should be avoided. An exception would be an instance where the tree is planted into an unmanaged nutrient poor soil. During the establishment phase, the maximum rate of N fertilization would be 1 pound of N per 1,000 square feet of root area per year. For a 4-foot diameter planting hole, 1 pound of N per 1,000 square feet is equal to 1 ounce of 21-0-0 or 1.5 oz of 13-13-13.

### Growth Phase

During the growth phase the landscape manager can encourage healthy vigorous growth by supplying proper nutrients to the root system of the tree. In many situations, N will be the only nutrient necessary to add. Applying too much N can lead to environmental runoff problems and excessive shoot growth. It is recommended that only 1 pound, and no more than 2 pounds, of N per 1,000 square feet per year is applied over the root zone of the tree. This rate of nitrogen is sufficient to encourage healthy vigorous growth without producing excessive growth.

### Maintenance

In the maintenance phase, the tree is nearing maturity and fulfilling its intended role in the landscape. Often, no fertilization is necessary unless symptoms of nutrient deficiencies arise. When deficiency symptoms do arise, a soil test will identify potential areas of concern and eliminate the need for unnecessary fertilization. If fertilization is recommended, a maximum of 1 pound of N per 1,000 square feet over the root system should be used once per year. This will provide the required N without inducing excessive growth on a mature tree.

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