



Florida Cooperative Extension Service

Fertilization Recommendations for Trees and Shrubs in Home and Commercial Landscapes¹

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FERTILIZER PLACEMENT

Fertilizer placement in relation to the plant root zone is very important. Roots were generally thought to occupy the soil mass directly below the tree or shrub canopy to a depth of 20 inches or more. Recent studies have indicated that root depths are usually a maximum of 10 to 14 inches due to the naturally high oxygen concentrations near the soil surface (1), and more than 50% of the roots of several tree species extend beyond the dripline by as much as three times (2). Many roots of mulched plants are located just beneath the mulch on the soil surface. Consequently, for maximum utilization, fertilizer should be applied to the soil or mulch surface. Since most feeder roots on trees and shrubs are shallow, there is no need to inject or place fertilizer deep in the soil. However, shallow soil injections on mounds, berms and slopes, and in compacted soil will reduce the amount of fertilizer runoff due to irrigation or rain.

A large, aesthetically-pleasing mulched area should be maintained around trees and shrubs. A general rule is to maintain a 2-foot diameter mulch area for each inch of trunk diameter on newly planted trees, i.e. a tree with a 2-inch diameter trunk would grow best with a 4-foot diameter mulch area. The size of the mulched area can be increased as plant size increases. This mulched area promotes faster tree establishment by eliminating grass root

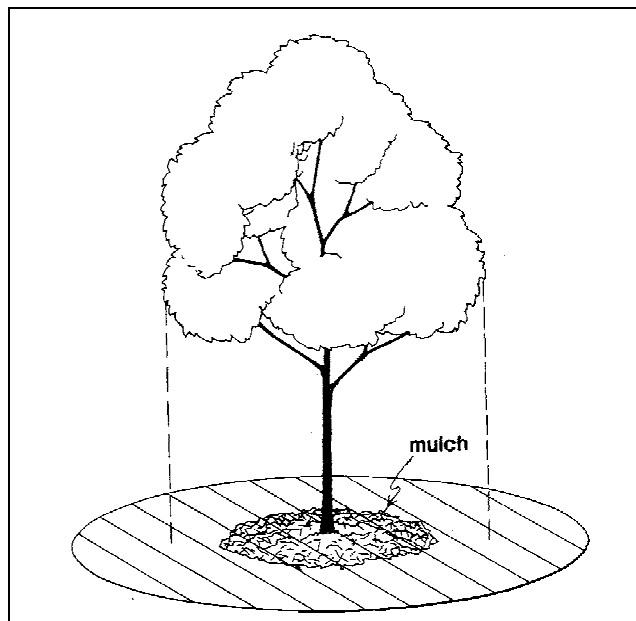


Figure 1. Fertilizer placement for trees.

competition for water and nutrients. Also, the maintenance of turf areas adjacent to plant trunks is not recommended because it is difficult to trim the turf without damaging trunks. However, other ground covers that are not such strong competitors for water and nutrients can be planted near trees.

Fertilizer should be applied to the mulch surface and to the unmulched area around a tree not to exceed one and one-half to two times the canopy

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diameter (Figure 1). If the turf was fertilized within the past 2 weeks, do not apply additional fertilizer to the turf area around the tree; only fertilize the mulched area and base the amount of fertilizer applied on the mulch square footage. The fertilizer nutrients will move rapidly with the irrigation water through the mulch.

Most established trees (3 to 5 years after transplanting) growing in landscapes where turf and shrubs are fertilized do not need additional fertilizer. Their root systems extend throughout the landscape past the edge of the tree canopy and receive nutrients when these areas are fertilized; however, supplemental applications may be needed for some trees because nutrient deficiencies could develop.

There are a few situations where trunk injection of fertilizer is warranted. A good candidate for trunk injection would be a tree with a micronutrient deficiency that did not respond to soil applications of fertilizer. Each situation is different and the merits of injection should be judged by a professional tree specialist. Remember that trees are permanently damaged by trunk injections and the potential benefits must outweigh this damage.

FERTILIZER TIMING

Trees, shrubs and ground covers can be fertilized 4 to 6 weeks after planting. Most established landscape plants grow well with two or three fertilizer applications per year. One application is normally scheduled around February (south Florida) or March (north Florida) and another in September (north) or October (south). The third application can be made during the summer. Fall applications facilitate nutrient utilization during the cool months and are very important for growth flushes in the spring.

SOIL TESTING

A soil test will provide information about the nutritional status of a soil and may aid in the detection of potential problems which could limit growth. Test the soil area to be fertilized prior to purchasing fertilizer. Obtain a composite soil sample by removing subsamples from 10 to 12 small holes dug throughout the sample area (e.g. the front yard of your home). Carefully pull back mulch, grass or ground covers to expose bare soil. With a hand trowel or shovel, dig the small holes 6-inch deep and remove a 1-inch thick by 6-inch deep slice of soil from the side of each hole. Combine and mix the

subsamples in a clean plastic bucket. Obtain separate composite samples from areas that have different soil types, receive different cultural practices or contain plants that have distinctly different fertility requirements. Two to three areas of a 1/4- to 1-acre lot will often be sampled separately. Soil samples should be sent immediately to the University of Florida Extension Soil Testing Laboratory or a commercial laboratory. Samples sent to the University of Florida should be accompanied by IFAS form 2811 (Landscape and Vegetable Garden Soil Test Information Form, available from the County Extension Office) with the appropriate landscape plant option selected. Remember that sample collection should precede spring fertilization by a couple of months.

FERTILIZER TYPE

A complete fertilizer with a ratio of approximately 3:1:2 or 3:1:3 (e.g. 15-5-10 or 15-5-15) of nitrogen (N), phosphorus pentoxide (P_2O_5) and potassium oxide (K_2O) is generally recommended unless the soil test reveals that phosphorus and potassium are adequate. Fertilizers that are "slow-release," "controlled release," sulfur coated, or with nitrogen as IBDU or ureaformaldehyde have extended release periods compared to fertilizers that are readily water soluble. Thirty to 50% of the nitrogen should be water insoluble or slow-release. This is beneficial because plant roots can absorb the nitrogen over a long period of time. A fertilizer containing 30-50% slow-release potassium should be used in south Florida or where soil potassium is frequently inadequate. A fertilizer containing magnesium may be needed if plants often exhibit magnesium deficiency symptoms and for soils with inadequate magnesium.

Water-soluble fertilizer is less expensive than products that provide extended release, but the components of the water-soluble fertilizer may leach quickly through the soil. In sandy soils, the soluble fertilizer may move past the root system after only a few inches of rainfall or irrigation. In finer-textured marl, clay or muck soils leaching will be slower, but runoff may be greater.

Micronutrient deficiencies can be corrected with foliar sprays if deficiencies are not severe; however, correction is usually temporary. Persistent deficiencies may be prevented by applying a fertilizer with micronutrient supplements. Micronutrients should be applied singularly to the soil only in the

case of severe deficiencies because of the danger of applying excessive amounts. Maintenance of recommended pH will minimize micronutrient deficiencies. Recommendations for raising soil pH are noted on the soil test report and recommendations for lowering pH are given in Circular 858, "Selecting and Planting Trees and Shrubs," available at the County Extension Office.

FERTILIZER AMOUNTS

For each application, apply a maximum of one pound of nitrogen per 1000 square feet. This rate is easy to calculate from the information given on the fertilizer bag. Simply divide the nitrogen percentage (the first number of the analysis) into 100.

Example: You have purchased a 15-5-10 fertilizer, divide 15 into 100 (as shown in the equation).

$$\frac{100}{15} = 6.6$$

Therefore, 6.6 pounds of 15-5-10 will supply one pound of nitrogen to be distributed over 1000 square feet of landscape area.

If the soil tests high for phosphorus and potassium, these don't need to be applied (Table 1). Soils low in phosphorus and potassium should receive the equivalent of 0.7 and 1.4 pounds of phosphorus pentoxide (P_2O_5) and potassium oxide (K_2O), respectively, per 1000 square feet per year. Phosphorus can be applied in one application; however, the total amount of potassium should be divided into three applications per year.

PALM FERTILIZATION

Palms exhibit certain nutritional disorders in unique ways. A recommended palm fertilizer for south and central Florida should have 10 to 20% nitrogen, 5% phosphorus pentoxide, 10 to 20% potassium oxide, 1 to 3% magnesium and 0.5% of both manganese and iron. This type of fertilizer is often referred to as a "palm special." The fertilizer should also contain sulfur and trace amounts of zinc, copper and boron. If possible, purchase a fertilizer which has the nitrogen, potassium and magnesium in controlled or slow-release forms; if soluble forms of these nutrients are used, apply in small amounts more frequently to prevent leaching. Additional palm fertilization recommendations are given in the "Palm Nutrition Guide" by Drs. Broschat and Meerow of the Ft. Lauderdale Research and Education Center.

OTHER CONSIDERATIONS

Too much nitrogen promotes excessive growth which increases maintenance costs and time. Disposing of excess growth as yard wastes is an additional problem and expense. Application of too much soluble nitrogen causes environmental concerns, i.e. nitrogen leaching into water supplies or polluting surface waters such as lakes, rivers, bays and retention ponds. Additionally, nitrogen is not utilized efficiently by unthrifty plants. Diseased or damaged roots, improper soil pH, waterlogged sites and plantings that are too deep can result in inefficient nutrient absorption and nutrient deficiency symptoms.

LITERATURE CITED

1. Gilman, E. F. 1987. "Effect of soil compaction and oxygen on vertical and horizontal root distribution." *Journal Environmental Horticulture* 5(1):33-36.
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Table 1. Target pH and recommended nitrogen, phosphorus pentoxide, and potassium oxide fertilizer rates for ornamentals in the landscape.*

CROP DESCRIPTION	TARGET pH	IF SOIL TEST RESULTS INDICATE THAT										
		NITROGEN IS	PHOSPHORUS PENTOXIDE IS					POTASSIUM OXIDE IS				
			VL	LO	MED	HI	VH	VL	LO	MED	HI	VH
THEN APPLY (pounds per 1000 square feet per year)												
Woody Ornamentals or Trees in the Landscape	6.0	2.3	0.7	0.7	0.4	0	0	1.4	1.4	0.7	0	0
Azaleas, Camellias, Gardenias, Hibiscus, or Ixora in the Landscape	5.5	1.1	0.3	0.3	0.2	0	0	0.7	0.7	0.3	0	0
VL = VERY LOW; LO = LOW; MED = MEDIUM; HI = HIGH; VH = VERY HIGH												
* Phosphorus and potassium rates are based on interpretation of a Mehlich-I soil test.												