

Since it is easy to over-fertilize evergreens and cause injury, a low analysis fertilizer is recommended. The following ratios and rates are common:

3-2-1 at ½ cup per square yard
10-6-4 at 1/4 cup per square yard

The higher nitrogen ratios are useful for broadleaf evergreens. Slow-release fertilizers are especially good for use on evergreens. The slow release of nutrients eliminates problems with fertilizer burn.

All evergreens should be fertilized in the early spring. To improve color of broadleaf evergreens, additional nitrogen can be applied in a soluble form in June or July. Many broadleaf evergreens, such as hollies, rhododendron, mountain laurel, and andromeda, require an acid soil. The use of a fertilizer formulated for acid-loving plants will help to keep the soil at the proper pH. The pH may also be lowered by adding ground sulfur.

GROUNDCOVERS

Groundcovers should be fertilized at planting by adding 2 pounds of 5-10-10 fertilizer for each 100 square feet. Mix in the fertilizer by spading or using a rototiller. Once established, fertilize ground covers with slow-release fertilizer, since soluble fertilizer causes burning when it comes in contact with foliage. Broadcast fertilizer each spring at the rate of 2-3 lbs. per 100 square feet.

ROSES

Roses respond well to the following fertilization program. In late winter (Jan. - Feb.), apply 5-10-10 fertilizer at the rate of ½ cup per plant (or 2 lbs./100 square feet). Follow this with applications of 1/4 cup 5-10-10 per plant in mid-June, mid-July, and mid-August. Do not apply fertilizer to roses after August 15.

FLOWERS

Correct the soil fertility and pH before planting a perennial garden when thorough tilling of the soil is still an option. Ordinary garden fertilizers, like 5-10-10, 5-10-5, and 10-10-10 are satisfactory for perennial plants. Fertilize in early spring, before growth starts, with ½ cup fertilizer per square yard of surface area. Repeat fertilization in June, using 1/4 cup per square yard if deficiencies appear.

Most perennials do not need additional fertilizers. For chrysanthemums, add 1/4 cup per square yard in July and August.

Fertilize annual plants with a garden fertilizer, such as 5-10-10. Apply 1 cup of fertilizer per square yard of bed as the ground is being worked before planting in the spring. Six weeks later, or when the first flowering cycle is over, sprinkle one to two tablespoons around each plant.

In general, bulbs require less nutrients than most other garden flowers. For bulbs that are left in the ground year round, apply bone meal at planting at a rate of 5 pounds per 100 square feet of bed area, or about 1 level teaspoon per planting hole. Fertilize summer-flowering bulbs, which are dug each fall and replanted in the spring, with a general purpose fertilizer, such as 5-10-5, at a rate of 1 pound per 100 square feet at planting time. Continue fertilization at the same rate every 2 - 3 weeks from the time the plant emerges from the ground until the buds take on color.

ADDITIONAL INFORMATION

Additional information may be obtained from the University of Delaware Cooperative Extension offices in Newark, Dover, and Georgetown.

Prepared by:

Susan Barton, Extension Specialist, Horticulture

Revised, October 2002

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SOIL TEST NOTES

NOTE 13: Fertilizing Ornamental Plantings

LIME

Ornamentals can be divided into 3 groups with regard to pH: Those preferring a near neutral pH (6.0 to 7.0) like clematis, lilac, peony, English yew and tamarix juniper; those tolerant of a range of slightly acid reactions (5.5 to 6.8); and those needing an acid soil (5.0 to 6.0). Most ornamentals fall into the middle group. Plants needing acid soils include azaleas, hollies, blueberries, and some wildflowers.

Lime is used to raise the pH of a soil. It is best mixed into the soil at planting or when a bed is prepared. When lime is applied to the ground surface, it moves through the soil very slowly. However, in established plantings surface applications every 3 years are the only way to add lime to the soil. Dolomite, or high-magnesium lime, is recommended for use with ornamentals. This adds magnesium to the soil, as well as calcium. It should be finely ground (100 mesh) to react quickly in the soil.

Too much lime can be a problem, especially on light sandy soils. It may result in deficiencies of some micronutrients. In ornamentals, the most common deficiency from over-liming is iron. Reduce pH by adding elemental sulfur to release bound iron.

FERTILIZERS

There are two things to keep in mind when using different kinds of fertilizers. First is the analysis. The three numbers, such as 10-10-10, refer to the percentages of nitrogen, phosphorus (as P₂O₅), and potassium (as K₂O) in the fertilizer. The second factor is the solubility. Soluble fertilizers release their nutrients rapidly whereas slow release fertilizers release their nutrients over a period of time. Most, but not all, organic fertilizers are slow release.

Which fertilizers are best to use? The answer depends on the kind and age of plant, frequency of

applications, rate, cost, and application equipment available. Plants with fine root systems near the surface, such as azaleas, are often susceptible to improper fertilization. Use of slow-release fertilizer would prevent burn caused by having too much fertilizer available at one time. A combination of soluble fertilizer and slow-release nitrogen provides immediately available nutrients as well as nitrogen for long-lasting effect, in a form that won't burn tender plants. Slow-release fertilizers are excellent for regular maintenance of landscape plants, when an immediate response to the fertilizer is not required.

TREES

Nitrogen is the most important element for tree response. Most garden soils contain sufficient phosphorus and potassium to support accelerated growth from nitrogen application. For trees growing in phosphorus or potassium deficient soils, a slow-release high-nitrogen complete fertilizer, such as 14-14-14, should be used.

Surface broadcasting fertilizers over the entire area of the root system is an effective and efficient method of application. About 80 percent of all fibrous roots are found in the upper 12 inches of soil, and many are found in the upper 6 inches. Therefore, a surface broadcast application can easily reach a majority of the root system.

Fertilizer recommendations should be based on the spread of the tree's root system, and not on the diameter of the trunk (as was thought in the past). To get the most from the fertilizer applied, it is important to distribute the recommended amount over the entire root zone. The fibrous root systems of most shade trees extend far beyond the tree's crown or dripline. Soil sampling should be used to map the extent of the root zone. The Universal Tree Fertilization Computation formula can be used to determine the amount of fertilizer needed per tree. First, determine the radius of the root system (from the trunk to the periphery) in feet. The rate of fertilizer application should be between 2.5 and 5 lbs. N per 1000 sq. ft., depending on the growth rate desired. A young tree which is growing rapidly requires 5 lbs. N/1000 sq. ft. per year, whereas 2.5 lbs. N/1000 sq. ft. every few years is sufficient to maintain the vigor of an old, established tree. Choose a fertilizer formulation that fits the tree's needs. Ammonium nitrate (33-0-0) is good for soils that are not deficient in phosphorus or potassium. A slow-release fertilizer, such as 18-6-12, provides nitrogen, phosphorus, and potassium over a nine-month period. When all these factors are

determined, you are ready to use the formula:

$$\frac{R^2 \times \text{lbs. N}/1000 \text{ sq. ft.}}{3.5 \times \% \text{ N in fertilizer}} = \text{lbs. fert. needed}$$

Where:

R = distance from the tree trunk to the periphery of the root system

3.5 = conversion constant of the Universal Tree Fertilization Computation

% N in fert. = % nitrogen in fertilizer that you are using

lbs. fert. = desired rate of fertilizer in lbs per 1000 sq. ft. (typically 2.5 - 5 lbs. N/1000 sq. ft). To be spread evenly over root zone of tree.

Example:

The root zone has a radius of 8 feet and you have chosen to apply 2.5 lbs. N/1000 sq. ft. of slow-release 18-6-12 fertilizer. The amount of fertilizer needed for that tree is:

$$\frac{8^2 \times 2.5}{3.5 \times 18} = \frac{160}{63} = 2.5 \text{ or } 2 \text{ lbs. } 8 \text{ oz.}$$

The following table shows the amount of fertilizer needed to provide 5 pounds of nitrogen per 1000 sq. ft. to root zones as calculated by the Universal Tree Fertilization Computation.

Root system radius (feet)	Amount of fertilizer needed	
	18-6-12	33-0-0
2	5 oz.	3 oz.
4	1 lb. 4 oz.	11 oz.
6	2 lb. 13 oz.	1 lb. 8 oz.
8	5 lb. 1 oz.	2 lb. 13 oz.
10	8 lb.	4 lb. 5 oz.
12	11 lb. 8 oz.	6 lb. 4 oz.
14	15 lb. 8 oz.	8 lb. 8 oz.
16	20 lb.	11 lb.
18	25 lb. 8 oz.	14 lb.
20	32 lb.	17 lb. 8 oz.

Note: 8 oz. is approximately equal to 1 cup.

Trees may be fertilized any time from November 1 to April 1. Make sure nutrients are available during growth by applying slow-release materials in mid-fall (after the trees have dropped their leaves), winter, or very early spring. Soluble fertilizers, which are more quickly available, can be applied in spring. Do not fertilize newly planted trees at planting. If the root zone area is planted with groundcovers, grass, or other plants sensitive to high nitrogen levels, water in fertilizer to prevent burn. Fertilizer application for trees in lawn areas should be split into two applications two weeks apart to prevent burn.

SHRUBS

Shrubs may be divided into deciduous flowering shrubs, needle evergreens, and broadleaf evergreens. Deciduous shrubs have similar nutrient requirements to trees, but in lesser amounts. A ratio, such as 10-6-4, applied at a rate of ½ cup per square yard of ground underneath the shrub should provide adequate nutrition. Because nitrogen stimulates growth of foliage, a fertilizer with less nitrogen may be used with plants grown primarily for their flowers. Shrubs may be fertilized in early spring before plants leaf out (February or March) or in late fall, when plants become dormant and have lost their leaves. Late summer applications of fertilizer stimulate succulent growth, which is often killed during the winter, and should be avoided.