

Liming and Fertilizing Ornamental Plants

Lime and fertilizers are applied to encourage healthy, vigorous plants. Too much lime or fertilizer can actually harm or kill plants. Therefore, soil testing is necessary to determine the soil nutrient status and provide recommendations for applying lime and fertilizers in correct amounts. Contact your county Extension office for instructions and materials for soil testing.

Lime

Liming materials neutralize acid in the soil and provide some nutrients essential to plant growth. Some common materials used to lime acid soils include ground calcitic limestone, basic slag, ground dolomitic limestone, wood ashes, and flue dust. Calcitic limestone contains calcium. Dolomitic limestone contains calcium and magnesium. Basic slag contains calcium, magnesium, and a few micronutrients and is often fortified with phosphorus, potassium, and micronutrients. Wood ashes and flue dust also contain some plant nutrients, particularly potassium. The primary purpose of liming, however, is to neutralize soil acidity, not to add plant nutrients.

Lime can be applied any time of the year, but a winter application will begin to neutralize soil acidity before spring growth. On established plants, space lime and fertilizer applications at least 2 weeks apart or plants may be injured. Use finely ground lime materials to assure quick neutralization of soil acidity. Most liming materials are in fine, dusty powders. A pelleted limestone is available in some locations that will dissolve in rain, is dust free, and is easy to apply accurately using a lawn spreader.

Lime moves about 1 inch per year down through the soil. This slow movement of lime makes it important to mix lime deeply into the soil before planting ornamentals. For established plants, apply a maximum of 5 pounds of ground limestone per 100 square feet per application. This is equivalent to 1 ton per acre.

When soil test recommendations call for more than 1 ton per acre, space applications 6 months to a year apart to avoid a band of concentrated lime moving down through the soil. Too much lime can cause plant nutrient deficiencies. You will need 7 or 8 pounds of basic slag to equal the liming action of 5 pounds of ground limestone.

Fertilizer Nutrients

Fertilizers are liquid or dry materials containing plant nutrients. The three numbers found on the fertilizer container refer to the percentage of nitrogen (N), phosphorus (P_2O_5), and potassium (K_2O), in that order, in the fertilizer.

The N in many fertilizers is lost quickly from the soil. It is used by plants, washed through the soil by water, or lost to the air as ammonia or nitrogen gas. Therefore, to promote growth, apply N frequently, or use a slow-release N source such as sulfur-coated urea, manure, or compost. Fertilize lightly or not at all with N if additional growth is not needed.

Phosphorus (P) is held very tightly by soils (except pure sand) and cannot be washed out of the soil by watering. Furthermore, high levels of P make other plant nutrients, such as iron, unavailable and may result in discolored leaves and poor growth. This makes soil testing important to determine the need for P.

Potassium (K) can be washed through the soil by water but not as quickly as N. In sandy soils, K may need to be applied once every year. In clay soils, K may be needed only every few years.

Slow Release Fertilizers

Many commercial fertilizers release their nutrients quickly, and this fast release will “burn” or kill plants if too much fertilizer is applied at one time. “Slow release” fertilizers allow large applications without hurting plants. These fertilizers are sold as granules or as spikes for houseplants, shrubs, or trees. Some have a sulfur or resin coat to slow down the nutrient release.

Others contain synthetic substances, processed sewage sludge, or other organic materials that take a long time for soil organisms to break down into usable plant nutrients.

Slow release fertilizers are a safe, convenient way to fertilize in large amounts, thus reducing the number of applications per year. They are also expensive, typically costing four or five times as much per pound of fertilizer nutrient. They are a good alternative for special plants, such as a prize rose. Follow the manufacturer's recommendations on the use of these fertilizers.

Liquid Fertilizers

There is no magic to liquid fertilizers. They work the same as dry fertilizers, except the liquid may reach the roots more quickly. A dry fertilizer can be mixed with water and applied as a liquid. Or, a dry fertilizer can be watered lightly and dissolved after it is applied.

One advantage to liquid fertilizer is that it can be used for foliar feeding, that is, spraying weak nutrient solutions directly on a plant's leaves. The leaves then take up some of these nutrients. Foliar feeding may be needed to supply a plant with micronutrients, such as iron or zinc. If soil P is very high or, if soil acidity is very low (high soil pH), soil micronutrients may be unavailable to plant roots. A leaf burn is likely from foliar feeding if the nutrient solution is too strong.

Some houseplant fertilizers and specialty fertilizers for particular plants, such as azaleas and camellias, are sold as liquids. Follow the manufacturer's recommendations for these products.

Plants growing outside in tubs, pots, window planters, or raised planters might best be fertilized with houseplant fertilizers or slow release fertilizers. Replace this soil every year or two to avoid build-up of P typically present in high levels in these fertilizers.

Amount Per Application

If soil test results indicate a need for P or K, select a fertilizer containing appropriate amounts of these nutrients. Soil test recommendations will provide an example of a fertilizer or fertilizers that can be used. Other fertilizers may also correct soil nutrient deficiencies if used at the proper rate. Call your county Extension office if you need help in deciding whether another fertilizer can be substituted for the recommended fertilizer. Use the same percentage of N in the fertilizer to determine the maximum amount per application. The size of the plant or the area of soil to

be fertilized also determines the amount of fertilizer to apply.

The amount per application for a shrub should not exceed 3 teaspoons (1 tablespoon) per foot of height, for fertilizers containing 10 percent nitrogen. See the applications table for the maximum amount when using fertilizers with different levels of N. For trees, measure the width (diameter) of the trunk at 4 feet from the ground. For each inch in trunk width apply 0.1 pound of N. See the table for amounts needed to supply 0.1 pound of N from different percentages of N in the fertilizer. The amount of a particular fertilizer needed to supply 0.1 pound of N can be calculated by dividing the percentage of nitrogen in the fertilizer into 10. If the area under the tree or in the shrub bed is known, simply apply broadcast 0.1 pound of N per 100 square feet.

Applying Fertilizer

Spread fertilizer evenly under the limb spread of a shrub or tree to avoid burning roots. A shaker jar can be helpful. Sprinkle the fertilizer on top of the soil or mulch and water lightly. Rinse fertilizer off leaves to prevent foliar burn.

One method for trees is to bore holes 18 inches deep, 2 feet apart, under the entire tree and 2 feet beyond the dripline. Divide the fertilizer into as many equal parts as there are holes and place it in the holes. This tedious method will get fertilizer below turfgrass roots to tree roots. Boring holes in soil will also increase air movement into the soil, which often stimulates tree root growth and results in healthier, vigorous trees.

A reasonable alternative to boring holes is to fertilize trees with a lawn fertilizer spreader in February. Early spring rain will move the fertilizer below turfgrass roots. A good lawn fertilization program will also benefit trees, making a separate fertilization program for trees unnecessary. Do not use lawn "weed-and-feed" fertilizers under trees or shrubs unless the label says it is safe.

Timing Applications

To stimulate growth, fertilize three times a year. Normally, the first fertilization is made in February for trees and in March or April for shrubs. Space later fertilizations 2 months apart. If the trees or shrubs are large enough, fertilize only once or not at all. Do not fertilize later than mid-August with N, or the new growth is likely to be injured by cold weather.

For roses and annuals, follow soil test recommendations for lime, P, and K, then fertilize with N monthly from March through August at half the rates recommended for shrubs. Perennial herbaceous ornamentals, such as tulips, irises, daffodils, dahlias, peonies, and daylilies, can be fertilized at the same rates as shrubs. However, one N application per year is usually sufficient. Disease and insect infestations are more likely when lush growth is stimulated by high rates of N.

Examples:

1. An established bed of daylilies, about 10 feet wide and 15 feet long.

Soil test recommendations: no lime, 120 pounds N per acre, 40 pounds P₂O₅ per acre, and 120 pounds K₂O per acre. The comment on the soil test report suggests: per 100 square feet, in March apply 2.5 cups 8-8-8; in May and July apply 1.3 cups 15-0-15.

The bed is 150 square feet (10 x 15 = 150). Therefore, half again as much fertilizer as suggested per 100 square feet will be needed (150 ÷ 100 = 1.5) in each application:

$$2.5 \text{ cups } 8-8-8 \times 1.5 = 3.75 \text{ cups } 8-8-8$$

$$1.3 \text{ cups } 15-0-15 \times 1.5 = 1.95 \text{ cups } 15-0-15$$

However, 8-8-8 and 15-0-15 are not available in the local garden store! A 13-13-13 fertilizer, ammonium nitrate (33-0-0), and muriate of potash (0-0-62) are available. The 13-13-13 can be substituted for the 8-8-8 if the right amount is used. Referring to the table, you see that:

$$2.5 \text{ cups } 8-8-8 = 1.5 \text{ cups } 13-13-13$$

$$1.5 \text{ cups } 13-13-13 \times 1.5 \text{ (for 150 sq ft)} = 2.25 \text{ cups } 13-13-13$$

Ammonium nitrate and muriate of potash can be substituted for the 15-0-15 (again, from the table):

$$1.3 \text{ cups } 15-0-15 = 0.6 \text{ cups ammonium nitrate} + 0.3 \text{ cups muriate of potash}$$

$$0.6 \text{ cups ammonium nitrate} \times 1.5 \text{ (for 150 sq ft)} = 0.9 \text{ cups ammonium nitrate}$$

$$0.3 \text{ cups muriate of potash} \times 1.5 \text{ (for 150 sq ft)} = 0.45 \text{ cups muriate of potash}$$

Therefore, this daylily bed can be fertilized in March with 2.25 cups 13-13-13, and in May and July with 0.9 cups ammonium nitrate plus 0.45 cups muriate of potash.

2. Chinese hollies around a home, all about 4- feet tall.

Soil test recommendations: 1 ton lime per acre, 120 pounds N per acre, 80 pounds P₂O₅ per acre, and 40 pounds K₂O per acre. The report suggests: per 100 square feet, apply 5 pounds lime now; in March apply 2.5 cups 8-8-8; in May apply 1.0 cup superphosphate; and in May and July apply 0.6 cups ammonium nitrate.

Now use the table to convert fertilizer materials to a per foot of shrub basis:

First, apply lime as recommended to the soil: Lime = 5 pounds per 100 square feet 8-8-8 = 4 teaspoons per foot of shrub Superphosphate = 1 1/2 teaspoons per foot of shrub Ammonium nitrate = 1 teaspoon per foot of shrub Now multiply these figures by four, since the shrubs are 4-feet tall. This will give you the actual amount of fertilizer material you will need to apply.

3. A rose bed.

Soil test recommendations: no lime, 120 pounds N per acre, 40 lbs P₂O₅ per acre, and 80 pounds K₂O per acre. The report suggests: per 100 square feet, in March and May apply 1.25 cups 8-8-8; in April and June apply 0.65 cups 15-0-15; and in July and mid-August apply 0.3 cups ammonium nitrate.

You already own a lawn fertilizer with a 24-8-16 analysis. No pesticides are in this product, so it is safe to use if used at the proper rate. Also this fertilizer contains the same ratio of nitrogen, phosphorous, and potassium as recommended by the soil test results. Therefore, it can be used for each of the six fertilizations alone to provide the needed nutrients. Roses should be fertilized monthly at half the rate of normal shrubs. This rate should be 0.05 pound nitrogen per 100 square feet. To determine the amount needed, divide the pounds of N desired by the percentage of N in the fertilizer:

$$0.05 \text{ pound N desired} \div 0.24 \text{ pound N per pound of } 24-8-16 = 0.21 \text{ lb of } 24-8-16$$

So, 0.21 pound of 24-8-16 per 100 square feet per application will supply the recommended nutrients at the correct rate. This would be about 0.4 cup of 24-8-16 per 100 square feet or 1/2 teaspoon per foot of height of each rose.

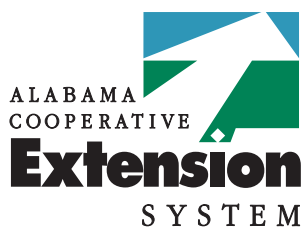
One pound of fertilizer is assumed to be equivalent to 2 cups of fertilizer. One cup is equal to 8 ounces or 16 tablespoons or 48 teaspoons. One tablespoon equals 3 teaspoons.

Fertilizer	Cups per 100 Square Feet ^a	Pounds per 100 Square Feet ^a	Teaspoons per foot of shrub height
8-8-8	2.5	1.25	4
10-10-10	2.0	1.00	3
13-13-13	1.5	0.77	2
15-15-15	1.3	0.67	2
15-0-15	1.3	0.67	2
Ammonium nitrate (33-0-0)	0.6	0.30	1
Sodium nitrate (16-0-0)	1.3	0.63	2
Ammonium sulfate (21-0-0)	1.0	0.48	1½
Urea (46-0-0)	0.4	0.22	½
Muriate of potash (0-0-62)	0.3	0.16	½
Sulfate of potash (0-0-50)	0.4	0.20	½
Superphosphate (0-20-0)	1.0	0.50	1½
Bonemeal (0-20-0)	1.0	0.50	1½
Triple superphosphate (0-46-0)	0.4	0.22	½
Ground limestone ^b	10.0	5.00	15

^aThe numbers in these columns are also equal to the cups or pounds of a 4-foot height.

^bThese rates of limestone are equivalent to applying one ton per acre.

Table 1. Maximum Safe Amount Of Fertilizer Per Application.



ANR-0388

Revised by J. David Williams, Extension Horticulturist, and C.C. Mitchell, Jr., Extension Agronomist. Originally prepared by **Walter F. Sowell, former Soils Specialist.** Two earlier revisions were made by Extension soils specialists and horticulturists.

Use pesticides only according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

The pesticide rates in this publication are recommended only if they are registered with the Environmental Protection Agency or the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply any pesticide, check with your county Extension agent for the latest information.

For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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Reviewed for Web July 2011, ANR-0388