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Fertilizing Landscape Trees and Shrubs

INTRODUCTION

Trees and shrubs in the landscape are fertilized to promote growth and maintain vigor. Most Maryland soils that are not disturbed by construction have adequate nutrients to maintain healthy plants. The most limiting factor causing problems to trees and shrubs is not nutritional but one of heavy soils, inadequate drainage and poor planting

> Since most urban landscapes have been disturbed during house construction and the natural cycling of nutrients is disrupted by annual fall leaf raking, there is a need to evaluate the nutrient status of trees and shrubs, and apply fertilizers if needed.
>
> **For soil testing information, contact: The Home and Garden Information at extension.umd.edu/hgic**

Trees and shrubs require adequate levels of 13 soil-absorbed nutrients for growth and development. Prior to fertilization, the plant nutrient requirements and your landscape goals need to be determined. For mature trees and shrubs the goal is usually to provide a rich, stable environment to promote long-term health. For young trees the goal may be to encourage new growth. Selection of the right fertilizer and applying the proper rates in the correct area will then aid in achieving these goals.

Whenever possible, a soil and/or foliar nutrient analysis should be conducted to determine which nutrients are deficient and in many cases why they are deficient. Secondary and micro nutrient deficiencies are closely related to soil pH. The pH should be corrected, if necessary, before the deficient nutrient is applied to the soil.
If foliar nutrient analysis is not available, look for visual symptoms of nutrient deficiencies. Undersized leaves and short new twig growth generally indicate a nitrogen deficiency. The yearly rate of new twig growth for a tree varies with the species, soil conditions, rainfall and general environment. Young trees in good condition produce approximately 8 to 12 inches of growth on the main branches yearly. As trees mature, the growth may be only half as much and yet still be healthy. Lack of growth is usually an indication of a nitrogen deficiency.

Yellow or chlorotic leaves may be another symptom of a lack of soil nutrients. Because damage by insects or disease can sometimes cause similar symptoms, these possibilities should also be checked out. When fertilizer is applied to soils prior to planting, it should be incorporated into the upper several inches. Proper tree and shrub fertilization is a long-term investment for a more attractive landscape.

FERTILIZING TREES

How much and how often to fertilize shade trees depends on your landscape goals and the current nutrient status of the soil. Small trees, where rapid growth is desired, should be fertilized annually.

> Established trees typically are fertilized once every 3 to 4 years, although most arborists prefer annual application of a low level of nutrients as infrequent, high rates tend to contribute more to environmental contamination.

Fertilizer can be applied, and is absorbed by plants, any time during the year as long as the soil is not frozen or too dry. The best time of the year to fertilize shade trees runs from the fall, through the late winter before growth appears in the spring. Fertilizer is absorbed by roots during the winter months as long as soil temperatures are above 40 degrees F. This makes it available to the plant for growth in the spring.

SELECTING A FERTILIZER

Commercial fertilizers can be purchased as a liquid, a granule, or a spike. They are identified by an analysis such as 10-6-4, 5-10-5, or 30-7-7. The first number is the percentage of the nitrogen (N), the second is the phosphorus (P), and the third is the potassium (K) in the fertilizer. A fertilizer with these three major plant nutrients, NPK, is called a complete fertilizer.

To calculate the total percentage of WIN, divide the percent of water insoluble nitrogen by the percentage of total nitrogen and multiply by 100. For example, in the sample shown below, the result is 10 percent divided 20 percent X 100 = 50 percent). Therefore, this fertilizer contains 50 percent WIN.

Sample fertilizer label:

20-10-10
(NPK)

Guaranteed analysis:	
Total nitrogen	**20%**
Water insoluble nitrogen (WIN)	10%
Available phosphates	**10%**
Water soluble potash	**10%**

Secondary and microelements may also be included in some fertilizers. They will be listed under "guaranteed analysis". Another critical component of fertilizers is water insoluble nitrogen (WIN). The higher the WIN number, the longer lasting and the safer for the environment the fertilizer will be.

Nitrogen stimulates leaf, root, and shoot growth. Phosphorus is used for flower, fruit, and seed development, and potassium promotes root growth and water management. A commonly used complete fertilizer for trees and shrubs has a ratio of 3:1:1.

DETERMINING THE FERTILIZER RATE

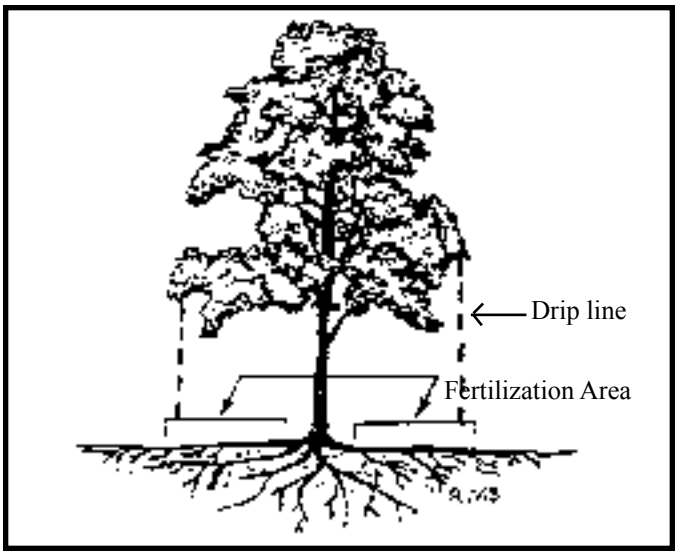
In order to avoid root burn and movement into streams or ground water it usually is best to choose a slow-release form of nitrogen. Fertilizers, with at least 50% of their N as WIN are considered slow-release.

The application rate is based on the area of the highest root concentration. This varies with the species of tree and its age. Generally, it is from the trunk to near the drip line. The "drip line" is the distance from the trunk that the branches reach. Start by measuring the approximate area to be fertilized. For example, if the zone is 50 by 50 feet, the area is 2,500 square feet. The amount of fertilizer is based on the actual nitrogen. The recommended rate of slow-release nitrogen is 2 to 3 lbs. of actual nitrogen per 1,000 square feet.

To fertilize 2,500 square feet using a 10-6-4 analysis fertilizer at the rate of 2 lbs/1000 sq. ft. of nitrogen, would require 20 lbs. per 1000 sq. ft. of slow-release 10-6-4 or 50 lbs. for the entire 2500 sq. ft. area.

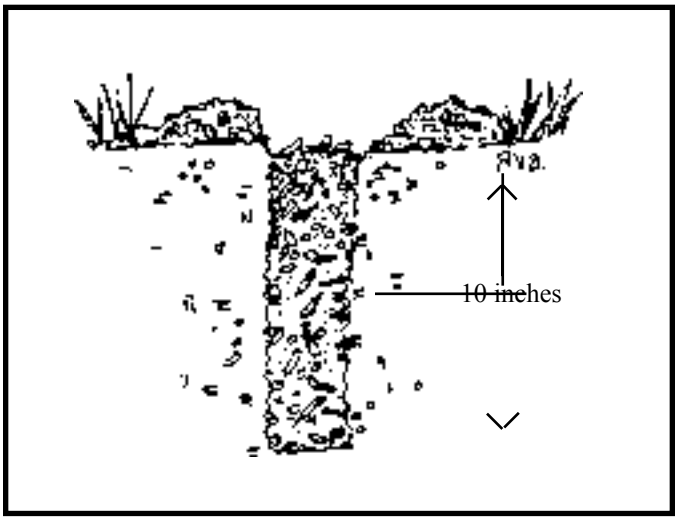
FERTILIZING METHODS

"Fertilization area" and the total "root zone area" can be different. The root zone may be three times the radius of the drip line.The fertilization area is inside the drip line. This is the area of the highest root concentration.



Surface Broadcast:
The easiest way to fertilize large trees surrounded with mulch or bare soil is to broadcast granular fertilizer on the surface of the soil and allow the rain to transport the nutrients to the roots. Broadcast the fertilizer on the area under the tree, beginning near the trunk to the drip line. Broadcasting on turf or sloped surfaces in watershed areas, should be avoided.

Holes:
Another method is to place the fertilizer into the soil via holes made in the soil. Granular or liquid fertilizers may be placed into holes 8 - 10 inches deep. These holes should be made in a regular pattern at 2- to 3- foot intervals. Avoid drilling into large buttress roots. Drilling the holes with an auger makes larger diameter holes and does not compress the soil around the holes. For an added benefit, fill the holes with finely ground compost or other organic matter, such as a fine-textured mulch. This is called vertical mulching and allows for greater airflow and water to penetrate heavy clay soils. Vertical mulching alone, even without fertilizer, encourages better root growth in lightly compacted sites.



Liquid Injection:
Another popular method used by commercial arborists is injection of liquid fertilizers into the soil. This method is especially useful in turf areas or on slopes. There are similar devices with prepackaged water-soluble fertilizers that attach to the garden hose for homeowners. When using these, the tip of the injection needle should be inserted 8 to 10 inches into the soil, at 2-3 foot intervals, in the root zone of the tree. Follow the label instructions for correct application rates.

Compressed Spikes:
Compressed fertilizer spikes are another popular method used by many homeowners. These are driven into the soil with a hammer. They can only be used effectively when the soil is soft and moist. Their popularity is based on the simplicity and ease of application. Follow the instructions on the product label for the correct spacing and number of spikes to use.

Foliar Application:
Plants can absorb some nutrients through their leaves. There are various brands of liquid fertilizers that attach to the end of a garden hose for foliar application. Although plants absorb some nutrients through their leaves, large shade trees are not fertilized using this method. However, very small trees can benefit from this fertilizing method. Applying fertilizer diluted with water to the foliage and also on the soil around the plants is done when the leaves are fully developed in late spring to early summer. It is very important to follow the directions on the product. An excessive concentration of fertilizer, if applied during the hottest time of the day, can burn the foliage.Foliar fertilization is a common way to apply chelated iron to plants suffering from iron chlorosis. The benefits of foliar application of nutrients are only seen for one season.

FERTILIZING EVERGREEN AND DECIDUOUS SHRUBS

The roots of shrubs are very shallow and excessive rates of quick-release fertilizer can damage them. Broadcast a granular fertilizer uniformly on the soil under the shrub and a little beyond the drip line of the shrub. Use an application rate of 2 to 3 pounds of nitrogen per 1000 sq. ft. A lower rate of nitrogen fertilizer is used around foundation plantings to reduce excessive growth and the resultant need for pruning and trimming.

Most evergreens are acid-loving plants. Some of these include rhododendrons, azaleas, camellias, mountain laurel, pieris, hollies, and leocothoes. They require a soil pH range of 4.5 to 6.0. Fortunately, many undisturbed Maryland soils are already acidic enough to grow these plants well. Soils in regions of the state with a limestone base are not suitable for these plants unless special procedures are used to lower the soil pH.

Trade-name fertilizers prepared for acid-loving plants include materials, such as iron sulfate, to maintain an acid soil. Use them, when necessary, at the rates recommended. Repeated applications without checking the soil pH can actually make the soil too acidic.

Iron Chlorosis:
A symptom of a soil pH problem is iron chlorosis. Chlorosis is an interveinal yellowing of new leaves. This deficiency can be temporarily corrected by applications of chelated iron to the foliage or the soil. The soil pH should be corrected or the symptoms will gradually recur. If the pH is too high (alkaline), sulfur and iron sulfate are applied to the soil to lower the pH. Follow the directions based on the results of a soil pH analysis. If chlorosis persists, have the soil tested for manganese (Mn). It is best to test first and avoid misapplication.
Some other conditions that can cause chlorosis include poor soil drainage, over-watering, over-mulching, planting too deeply, magnesium deficiency, root nematodes, or a root injury.

Magnesium Deficiency:
In very sandy soils, magnesium deficiency can also be a serious problem with acid-loving plants. These symptoms generally appear as chlorosis of older leaves and short, unhealthy new growth. Soil or foliar testing is the only accurate method to determine this deficiency. The deficiency can easily be corrected by applying 4 –16 ounces of magnesium sulfate (Epsom salts) per 100 square feet and irrigating thoroughly.

PROBLEMS CAUSED BY EXCESSIVE FERTILIZER

Fertilization can be very beneficial to plants. However, high fertilizer concentrations can cause root damage or "burn".

"Burn" is a term describing visual symptoms of dehydration due to over-application of fertilizer. Symptoms resemble those of drought damage because plants are injured by lack of water, even though sufficient water may be present in the soil. Fertilization in late spring and early summer is more likely to burn roots, especially during a dry season.

Excessive use of fertilizer in the landscape can contribute to the nitrogen and phosphorus contamination of ground water, streams and ultimately the Chesapeake Bay. Most runoff problems are due to surface applications on slopes. Ground water problems may result from fast-release fertilizers on sandy soils. It is very important to select the correct analysis fertilizer, use slow-release whenever possible, and always read the label instructions.

Technical review :
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Protect the Bay. Use Pesticides and Fertilizers Wisely

ALWAYS READ THE PESTICIDE LABEL AND FOLLOW ALL DIRECTIONS AND SAFETY PRECATIONS

Mention of trade names does not constitute an endorsement by University of Maryland Extension

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