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Landscaping: Fertilizing Trees and Shrubs

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Fertilizer application can improve tree and shrub growth and can help them tolerate stresses like winter damage, drought, or pests but only if the elements applied are lacking in the soil. Fertilizer is not a miracle cure and can actually burn roots and foliage if applied too heavily. If applied at the wrong time, fertilizer may encourage the growth of tender tissues that are prone to injury.

When to fertilize

There is some discussion among tree care researchers and other professionals about when woody plants should be fertilized. Conventional current wisdom says that, since most tree and shrub growth occurs in spring, this is the time when fertilizer should be available to the plants.

Gradual reduction in annual growth is typical of woody plants as they mature but, if growth has slowed excessively or has stopped, fertilization may be needed. Also, specific nutrient deficiencies may become visible over time. For example, lack of iron causes leaf blades to turn light green to yellow with leaf veins remaining dark green (interveinal chlorosis). An overall light green color is often caused by nitrogen deficiency.

Fertilization of trees and shrubs is usually not needed every year, especially if the plants have been in the ground five years or longer. Observe the annual growth of the plants, and fertilize them *only* if soil tests indicate fertilizing may help (Sidebar 1).

Since trees and shrubs do most of their growing in spring and early summer, this is the time when fertilizer should be available to them. Soluble, quick-release fertilizers should be applied as the root system will quickly take up the nutrients. Slow-release fertilizers can be applied almost any time, including from late fall to early spring. The nutrients in these fertilizers are much more slowly available, making application timing less critical.

Trees and shrubs *should not* be fertilized during drought conditions or when they are under other stresses. The fertilizer may burn dry, tender roots. Also,

Sidebar 1

Fertilization may not be needed. All too often, consumers purchase unneeded fertilizers thinking they may help the plant when, in fact, fertilizing isn't necessary. If there is a question about whether or not a tree or shrub needs fertilizer, do one or all of the following:

- Have a soil analysis done on the area around the plant(s)
- Contact a local UWCES office to check the plant(s) to determine if fertilizing is needed
- Contact a Certified Arborist to check the plant(s). Certified Arborists are certified by the International Society of Arboriculture and must pass rigorous initial testing and must also keep up their certification with annual continuing education. Local Certified Arborists can be located on the ISA Web site at http://www.isa-arbor.com/findArborist/findarborist.aspx.

plants do not function efficiently when they are stressed, and nutrients will not be utilized effectively.

When in doubt, fertilize trees and shrubs in the spring.

What fertilizer to use

In Wyoming, the supplemental nutrients usually needed by woody plants growing in native soils are nitrogen (N), iron (Fe), and sometimes phosphorus (P). Potassium (K) and minor elements are usually found in adequate supply in native soils.

Sidebar 2

The numbers on the label of a package of complete fertilize correspond to N (nitrogen), P (phosphorus), and K (potassium) respectively. For example, if the label says 15-5-15, that means the contents are 15 percent N, 5 percent P_2O_5, and 15 percent K_2O. If the numbers on the label are 33-0-0, the package contains 33 percent actual N and no phosphorus or potassium.

By convention, P content is listed as P_2O_5 and K content is listed as K_2O on fertilizer package labels. To convert these numbers to the amount of actual P and K, multiply the number on the label by 0.83 (for P) and 0.42 (for K).

There are many fertilizers on the market today made for trees and shrubs. Complete fertilizers are those containing N, P, and K (Sidebar 2). These are suitable for trees and shrubs under most Wyoming conditions, provided the percentages of P and K are low.

Be sure any fertilizer used *does not* contain weed killers. Fertilizer-herbicide combinations (weed-and-feed types) are often sold for use on lawns but contain herbicides that can and do damage trees and shrubs.

There are several types of fertilizer formulations available.

- Water-soluble types are available to plants immediately. They come in liquid or dry forms; liquids are more expensive and are generally not practical for large areas.
- Foliar fertilizers are typically N or Fe, which are both easily absorbed by leaves. These are usually quick fixes, and their effects will not last long. They are not substitutes for a good, sound fertilization program. Apply foliar materials only on fully expanded leaves.
- Complete fertilizers contain N, P, and K. Labels on complete fertilizers must show the percent of N, P, and K in the package. The higher the concentra-

tion, particularly of N, the less of the fertilizer should be applied at any one time.

- Simple fertilizers contain N, P, or K. Commonly available simple fertilizers are ammonium sulfate (21-0-0), urea (43-0-0), superphosphate (0-20-0), triple or treble superphosphate (0-46-0), and potassium chloride or muriate of potash (0-0-60).
- Special-purpose fertilizers include those formulated specifically for particular plants. Examples include “azalea” and “rose” fertilizers. “Azalea” formulations are acidic while “rose” formulations favor flower production.
- Organic fertilizers are made from plants and/or animals or their byproducts. Some common organic fertilizers include bone meal, blood meal, manure, etc. These typically have low nutrient contents and generally are slower acting than inorganic types.
- Sticks, stakes, and tablets are dry fertilizers compressed into various shapes. Sticks and stakes are pounded into the soil, and tablets are dropped into holes drilled into the soil. These are usually slow-release, dissolving over time. These do not work well in dry soil. They tend to stay intact, do not dissolve, and thus provide very little nutrition to the plant.
- Combination types include such products as fertilizer-insecticide or fertilizer-herbicide mixes. The latter *are not* recommended for use around trees and shrubs.
- Controlled- or slow-release fertilizers dissolve slowly over time; the length of time varies with the product and the weather. These are typically complete fertilizers coated with some type of wax or resin. With increasing moisture and temperature, the coating dissolves away, releasing the nutrients inside. These offer several advantages including minimal leaching into groundwater and fewer applications needed; however, they are expensive.

How much fertilizer to apply

An initial soil test is always recommended before fertilizing trees or shrubs. Local University of Wyoming Cooperative Extension Service (UW CES) offices can assist in this process. If fertilizer is needed, the soil analysis will suggest rates to use.

If the trees or shrubs are in a lawn area, they may be receiving enough nutrients with turf fertilizer. If fertilizer is needed for woody plants in lawns, *do not* apply more than 1 pound of actual N per 1,000 square feet. (For example, a one-pound bag of 5-10-5 fertilizer contains 0.05 pounds of actual N.) Amounts over 1 pound will likely damage the turf. Conifers typically need less fertilizer than deciduous trees, sometimes half as much.

If the trees and shrubs are growing normally and appear healthy, there is probably no need to fertilize. Stressed or unhealthy woody plants should not be fertilized either. The UW CES does not recommend fertilizing newly planted trees or shrubs for the first year or two as burning of the new roots may occur.

If the trees or shrubs are not in a lawn area, higher levels of N can be used, up to 3 pounds actual N per 1,000 square feet. Usually, N is the most important nutrient

to add in Wyoming. Add P and K if a soil test shows them to be deficient.

There are two ways to figure fertilizer application rates: by area and by plant size.

Figuring by area

First, determine the area to be fertilized by setting out four stakes in a square around the tree so the sides of the square are just outside the tree's drip line (Figure 1). Measure the distance along two of the sides and multiply them together to get the square footage to be fertilized.

Trees and shrubs in Wyoming can be fertilized with up to 3 pounds actual N per 1,000 square feet, often in split applications during the growing season. Base application rates on results of soil tests.

Suppose the fertilizer to be used is 21-4-4. To determine the amount to use per 1,000 square feet, divide the desired amount of N (soil test results recommended 2 pounds per 1,000 square feet) by the percent N in the formulation (0.21):
2 ÷ 0.21 = 9.5 pounds.
Next, divide the area under the tree by 1,000 and multiply this number by the pounds of fertilizer needed per 1,000 square feet.

If the area to be covered was 20 x 20 or 400 square feet:
400 ÷ 1,000 = 0.4.

If 2 pounds of actual N is to be applied, multiply 0.4 by 9.5:
0.4(9.5) = 3.8 pounds of 21-4-4.

Figuring by plant size

Trunk size, height, or spread of the plant can also be used to figure the

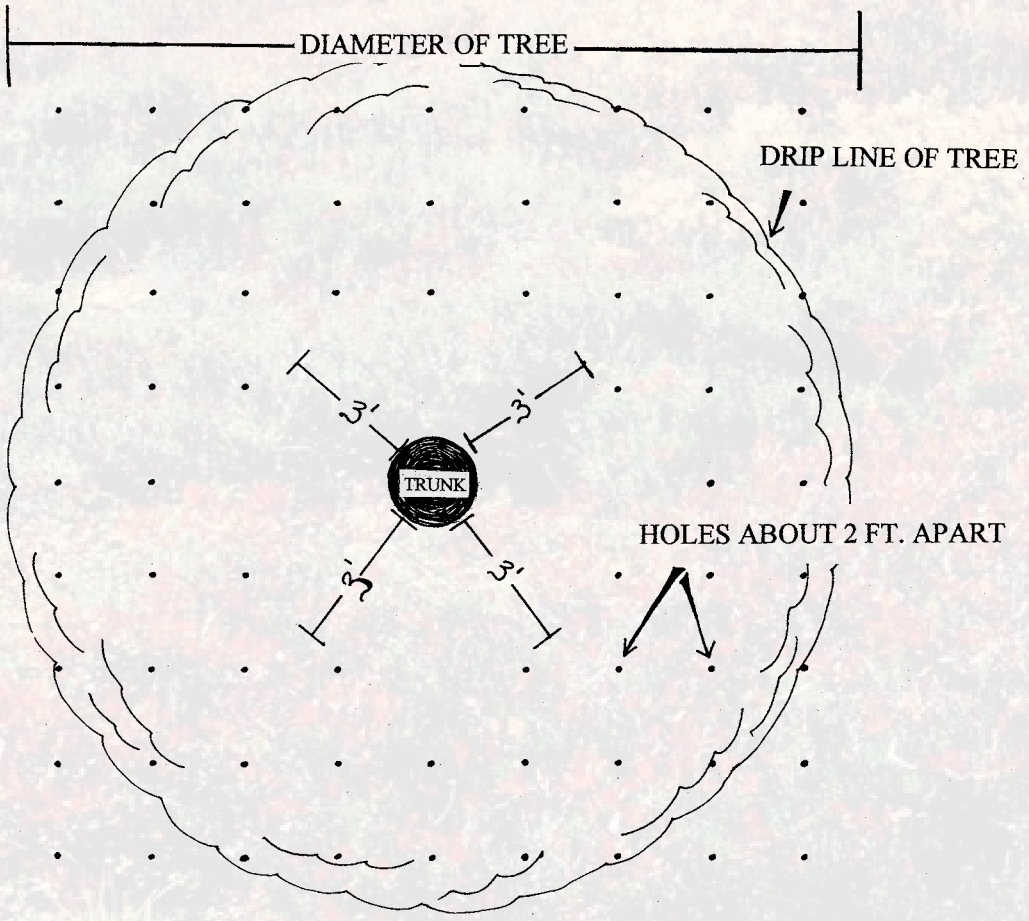

Figure 1. Diagram of proper spacing of fertilization holes under a tree's dripline.

amount of fertilizer needed. For shade trees, measure the trunk diameter 4 ½ feet above the ground (diameter at breast height or DBH). If the diameter is less than 6 inches, up to 0.15 pounds actual N per inch of trunk diameter can be applied. If the diameter is more than 6 inches, up to 0.3 pounds actual N per inch of trunk diameter can be applied.

Flowering trees, such as crabapples and hawthorns, can be fertilized with up to 0.15 N per inch of trunk diameter. For shrubs, use up to 0.05 pounds N per foot of plant height or spread.

As an example, a 7-inch-diameter shade tree is to be fertilized with the 21-4-4 fertilizer. Multiply the pounds of N needed (0.3) by the trunk diameter (7):
0.3(7) = 2.1 pounds actual N.
Divide this number, 2.1, by the percent N in the fertilizer (0.21):
2.1 ÷ 0.21 = 10 pounds of 21-4-4.

How to apply fertilizers

Liquid or granular fertilizers can be broadcast over the area and then should be watered in to carry the nutrients to the tree or shrub root zone.

In order to minimize competition for P and K by turf, these nutrients should be applied in a complete fertilizer in holes drilled into the soil to a depth below turf roots. Holes should be drilled at 2-foot spacings, about 8 to 10 inches deep, 1 to 2 inches in diameter, and no closer than 3 feet from the tree trunk. The same square area (Figure 1) can be used to calculate square footage to be treated. Divide the fertilizer evenly among the holes and water in.

For slow-release sticks, stakes, or tablets, read and follow package label instructions carefully. For root feeders, avoid injecting the nutrient solution more than 8 to 10 inches down. Otherwise, it may be too deep for tree or shrub roots to reach.

For application of iron to correct deficiency chlorosis, foliar sprays are usually effective. See UW CES bulletin B-1097, *Iron Deficiency Chlorosis on Woody Landscape Plants in Wyoming*, for further information (Sidebar 3).

Trunk injections and implants are usually limited to correcting micronutrient deficiencies and should usually be a last resort. If the problem to be corrected (wrong plant in the wrong place, for

example) is chronic and holes must be drilled in the tree every year, replacement of the plant, or an alternative fertilization scheme, should be considered. Drilling holes in trees exposes tissue to any number of insects and diseases. The benefit of annual tree injections may be offset by the cost of its health. Trees less than 4 inches in diameter should not be treated with implants or injections.

The International Society of Arboriculture (ISA) suggests the following guidelines for woody plant injections (Sidebar 3):

- Inject fertilizer only if the plant has not responded to traditional fertilization methods, if tree roots are inaccessible, or when the root system is not able to absorb enough of the deficient nutrient
- Try foliar application first
- Injections are most successful with micronutrients such as iron or zinc.

In addition, a Certified Arborist (certified by ISA) should be hired. Injection systems should not be used by homeowners as serious injury to the tree can occur.

Sidebar 3

Here are some handy Web addresses for further information.

- UW CES horticulture bulletins http://www.uwyo.edu/CES/PUBS/Horticulture/Horticulture_Publications_Main.htm
- UW Soil Testing Laboratory http://www.uwyo.edu/renewableresources/soil/soil_lab.htm
- International Society of Arboriculture http://www.isa-arbor.com

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