In THE Zone

BY NICOLE WISNIEWSKI

Done properly, soil injection is the best way contractors can get fertilizer directly to a tree's roots, without having to lose the product to turf roots and soil particles. Photos: The Care of Trees

Contractors can ensure healthy, long-lasting trees by conducting regular examinations and following proper tree fertilization techniques.

Vitamins provide the body with a boost of daily nutrients.

But each person, based on specific needs, requires a different set of vitamins – a child may take children's vitamins, for instance, or someone who's active may take vitamins for an energetic lifestyle.

"We take vitamins with baseline levels of nutrients to make sure we're covering all the bases, but our bodies use only the materials we need," pointed out Rex Bastian, vice president of field education and development, The Care of Trees, Wheeling, Ill. "However, we wouldn't have to take a vitamin supplement if we watched what we ate."

One could compare a human's vitamin intake to tree fertilization. Not all trees need fertilization, and those that do will take what they need from what's available. But, since trees can't tell contractors how they're feeling, contractors should conduct thorough examinations of soil texture, pH, nutrient levels and tree species, age and health before determining trees' fertilization needs.

"Just because you put it in the ground doesn't mean the tree can use it to its advantage or that it will solve all of the tree's problems," Bastian said. "Fertilization is much more than that – it's complex, yet it is only one piece of a bigger picture."

FERTILIZATION FACTS. Examining trees' natural growth processes helps contractors determine fertilization requirements. "Trees drop their leaves in fall and those leaves break down over the course of an entire season or several years in a slow-release form," Bastian explained, adding that this is how trees receive nutrients naturally.

However, most ornamental trees live outside of their natural environment, whether in a client's landscape or lining a suburban street, so their surroundings may not provide the proper nutrients available for them to remain healthy, pointed out Kevin Allen, operations manager, Pro Care Lawn & Tree Care Services, Meridian, Idaho. "We typically have to fertilize trees because a landscape designer has installed trees that just don't belong in our area or a homeowner has put them in a stressful environment," he said. "I almost never fertilize a tree that is native and properly installed because it almost never needs it."

Bartlett Tree Care Experts also fertilizes urban trees annually due to lost nutrients. "The leaves and fallen twigs removed from the site affect nutrient cycling – we found that an average 2 to 3 pounds of nitrogen per 1,000 square feet per year is removed through the raking away of these leaves and twigs," explained Tom Smiley, arboriculture research, Bartlett Tree Research Lab, and adjunct professor, Clemson University, Charlotte, N.C. "We're trying to make up for that loss. You can look for symptoms of nutrient deficiency, such as pale green foliage, to help determine if these nutrients are being lost."

Soil injection is the fertilization method contractors use most because this is the best way to get a measured dose of nutrients directly to tree roots without passing through turf roots and soil particle filters, commented Wes Culwell, arborist and horticulturist, Green Lawn & Trees, Fort Worth, Texas. This is particularly important with phosphorus, which is a key element in root production and has difficulty moving vertically through soil, Culwell said.

Contractors can find most tree feeder roots in the top 12 to 18 soil inches, with support and stabilizing roots found deeper, Culwell remarked. "Therefore, feeding at levels much deeper than 8 inches risks the possibility of bypassing many of the feeder roots with the fertilizer," he said.

Soil injection, formerly called deep root feeding, has evolved over the years because of the realization that the bulk of tree roots that benefit from fertilization lay close to the surface, Smiley said. "This process puts the fertilizer close to the fine roots where the majority of absorption takes place," he said.

Fertilization's advantages are on a site-by-site basis – the result can be increased growth, vitality and plant health, depending on the tree's condition, soil compaction level and the fertilizer used, Bastian said. Contractors should evaluate each tree separately. An old tree, for instance, should be treated differently than a young tree, even though the raw materials they work with are the same. "Ask yourself, 'Would you take an 80-year-old person and put them in football training?' No. It's the same with trees," he said. "Another example is a tree in a parking lot. You may not want to fertilize it too much to force growth. Instead, you may want to keep it pruned back so it doesn't produce as much foliage and use a mild fertilizer to make sure it doesn't run short of things it needs, but yet you've still manipulated its growth rate so it doesn't get out of control."

ALL ABOUT APPLICATION. Contractors should apply fertilizer to a tree's entire root system, which generally radiates from the trunk past the drip line, pointed out Patricia Thomson, certified arborist, Kelly's Tree Care, Toronto, Canada. "Usually, contractors can expect to find the majority of the nonwoody roots close to the drip line," she said. "A grid pattern of fertilizer holes should be created over this rooting area at 2½-foot intervals."

Culwell recommends soil injections begin about one-third of the way out to the tree's drip line from the trunk. Injections should continue around the tree and radiate out to a few feet past the drip line, with injections made 30 to 36 inches apart, he said. "The amount of nutrients to provide should be determined and pump flow and pressure should be calibrated to deliver proper distribution of nutrients," he said.

And don't forget that a large number of fine roots rest close to the trunk, Smiley said. "People used to avoid the area close to the tree," he explained. "The old tale was that the fine roots were out at the drip line, and there are some there, but we're finding that a higher density of fine roots are halfway to the drip line and closer. When you fertilize, get as close as you can to the trunk without injuring the buttress roots."

Fertilizer recommendations, which are frequently based on trunk diameter inches, are made in pounds or gallons of fertilizer per diameter inch, Culwell explained. Recommendations also are made on the number of square feet in the growing areas of the tree's branch spread, he added. "In this method, trees growing in a restricted root zone, such as in a parking lot, would require less fertilizer than a tree of equal trunk diameter growing in an area with no root zone restrictions," he said.

Soil texture and pH also can affect how much, what kind and how often contractors should fertilize a tree. "Clay soils will retain nutrients longer with slow nutrient movement through the soil, while sandy soils will only retain nutrients for a short time before quickly leaching through the soil," Culwell said.

According to Thomson, research suggests fertilizing trees with 1 to 4 pounds of nitrogen per 1,000 square feet. "The hydraulic sprayer needs to be calibrated so that enough liquid is applied per hole to obtain this level of nitrogen and the tree is not over or under fertilized," she said.

Of course, this job also takes the proper piece of equipment – a pump that will put out about 150 pounds per square inch, Smiley advised. And calibrating the equipment before doing the job is crucial. "You need to know how long it takes to put out a given quantity of solution," he said. "We usually test that by putting the soil injector in a bucket and turning it on for a certain amount of time to see how much product comes out."

The injector also needs to have a means of regulating the soil depth a contractor intends to reach. "Typically, you should try not to put it in the ground lower than 8 inches because, from our research, we know that if you start at 8 inches, you'll end up 2 inches shallower where the majority of the roots are – between 4 and 6 inches deep," Smiley said. "You end up shallower because after the pressure pushes the material out, it always moves horizontally and then the pressure pushes it up."

In addition to a pump and soil probe, fertilizer is another ingredient needed to provide trees with nutrients, and various types of fertilizer will act differently. "There's natural organic, fast-release inorganic, slow-release man-made organic – a zillion different kinds," Bastian pointed out. "We know that fast-release inorganic doesn't last more than two to four weeks before it's converted to leachable forms – especially the nitrogen – and lost in the system. They all work differently, so the process will change based on what you use. If you use a fast-release form, you know you'll have to pay more attention to timing since it lasts less time than a slow-release fertilizer."

"A fertilizer should be chosen that has nitrogen in slow-release form, otherwise the available nitrogen may be quickly leached from the soil prior to pickup by the tree," Thomson added. "Products that we use have two- to three-year expected release times and we suggest that people wait that interval before fertilizing again."

Smiley advised that contractors use fertilizer that is at least 50 percent water-insoluble nitrogen because it lasts longer. "You can use this type of fertilizer any time of year except in severe drought or if the ground is frozen," he said. "With soluble fertilizer, there's less of a time window and the greatest degree of nutrient uptake is during the growing season."

Contractors must be mindful of tree age and nitrogen content in the fertilizer as well. "Young trees that are established and vigorously growing can take advantage of high nitrogen rates," Bastian explained, "while older, mature trees shouldn't be heavily fertilized. But this doesn't mean you can't use a fertilizer high in nitrogen – you just have to use a lower rate."

Contractors also should be careful if they detect insect or disease problems before fertilization, Smiley warned. "Fertilizing at this time can increase the pest population," he said. "If a tree has sucking insects like aphids, for instance, we may want to treat the insect at the same time we fertilize or fertilize after we treat the insect."

Soil health, such as texture and pH, can affect how contractors fertilize trees. Photo: The Care of Trees

TIMING TACTICS. Fertilization is best done when soil temperatures are optimal for root growth and adequate moisture is readily available, Thomson remarked.

This typically occurs in the spring and the fall when turf and shrubs are dormant and less likely to absorb the fertilizer before the tree gets it, Culwell said. "Also, the tree roots are actively absorbing and storing nutrients in preparation for the spring flush of growth," he said. "Fertilization should be done when the soil temperature is 40 degrees or above. Roots are not active at lesser temperatures."

And contractors can apply water-insoluble nitrogen fertilizer at any time of year because it lasts, so "if you apply it in spring, it's still there in the fall and vice-versa," Bastian explained.

However, contractors must be cautious when it comes to young trees. "They can be fed lightly throughout the growing season, being cautious of hot temperatures, whereas feeding a large, established tree even once a year may be too much," Culwell suggested.

"Fertilization should not be done when the plant is in stress or in the process of hardening off for winter, as this may force plant growth and cause damage from frost and freeze," added Tim Doppel, president, Atwood Lawn Care, Sterling Heights, Mich.

Two common mistakes used when choosing fertilizer are using a turf grade fertilizer for trees – "not all fertilizers are meant to treat underground roots," Doppel said – and using a fertilizer with high salt content. "It is very important to use a low-salt fertilizer that is meant for trees, otherwise root damage can occur," he added.

Smiley agreed. "A high salt index – not sodium chloride, but salts that make up the fertilizer – can draw water away from the roots and actually burn the trunk," he said.

And fertilizing a tree won't get a contractor anywhere if other problems are present, which is why contractors must conduct thorough tree checkups. "It happens with people too – they get a lot of tests and treatments, but their health still declines," Bastian explained, adding that for further recommendations contractors can look at the American National Standards Institute's A300 standards on tree fertilization at www.ansi.org. "Trees are the same way. Sometimes no matter what you do, they still decline. You have to make a judgment and decision that is your best and know what kind of results to expect. The only way you can do that is by making sure you check out all aspects of the tree's health before you fertilize." LL

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Check this story online for other tree fertilization mistakes to avoid.

FOR MORE INFORMATION

The International Society of Arboriculture developed companion publications (Best Management Practices) to aid in the interpretation and implementation of ANSI A300 standards. Included in this packet is a *Tree Fertilization* publication. The full text can be ordered at www2.champaign.isa-arbor.com/welcome.html or by calling 217/355-9516.