How to Obtain and Understand a Soil Sample Analysis Report

Proper soil chemistry is essential for the health of urban trees. Urban sites have a wide variety of soil conditions that rarely match natural woodland conditions. Many homeowners recognize their trees may need some type of fertilization, but they rarely know how to properly apply the fertilizer. Most often, homeowners are content to throw a random amount of granular fertilizer around the roots of their trees. Unfortunately, these “guesstimate” fertilizations seldom meet the needs of the trees and in some cases these fertilizations harm the trees.

Fertilization and liming should never be done without a proper soil analysis. In Georgia, soil samples are analyzed by the University of Georgia Cooperative Extension Service for a small fee. Free sample bags are provided at local extension offices. Samples should be returned the extension office from the county in which the sample was taken. Results are typically mailed within ten days of submittal. Other private arboricultural and agricultural companies also provide soil analysis. A soil analysis will tell homeowners how and when to apply fertilizer and lime.

Items Needed to Collect a Sample

Soil Sample Bag

+

Soil Probe

OR

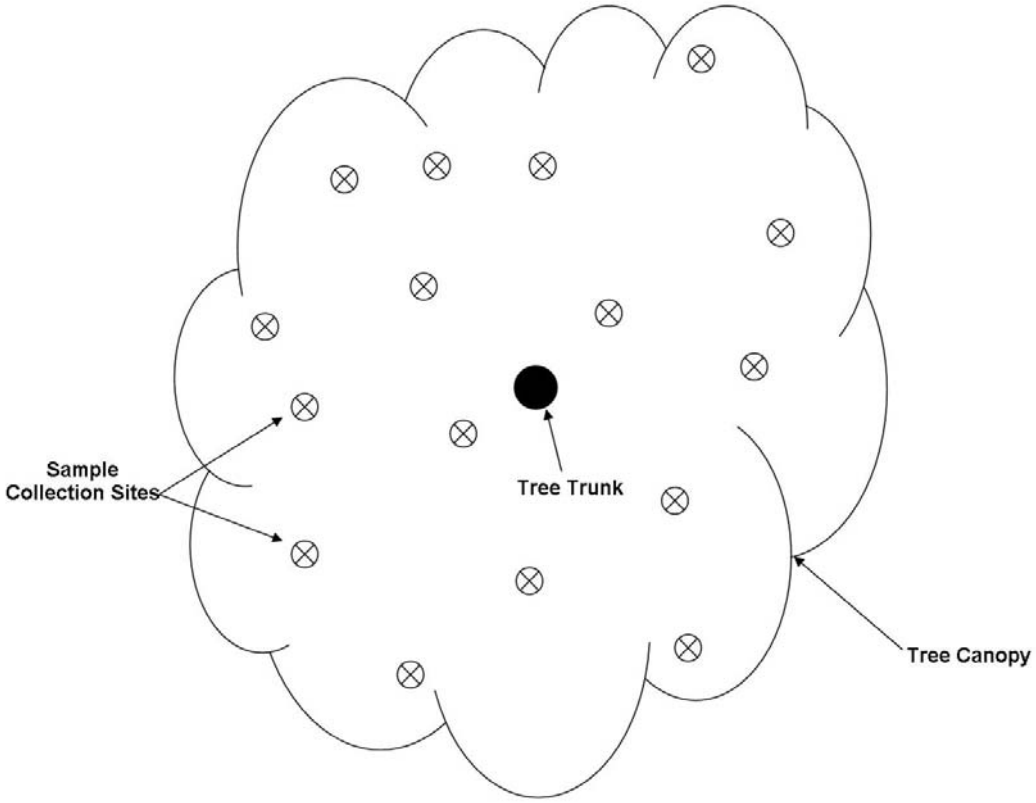
Garden Spade

+

Bucket

Collecting the Sample

A well-designed soil sample is needed to get accurate results from a soil analysis. Trees do not grow in the same manner as grasses or agricultural crops, so it is important to match the sampling technique to their growth habits. In Georgia, 90% of a tree’s roots will be found in the top 18-inches of soil. Home owners will want to use a soil probe or study spade that is able to sample deep enough to match root growth patterns. A good sample will have collections of soil from anywhere between 1 to 12 inches below the soil surface. Individual collections should be gathered from multiple locations around the tree. Depending on tree size, 8 – 15 random individual collections are needed from beneath the canopy of the tree. Thoroughly mix the collected soil in a plastic bucket and remove approximately 1 pint of soil and place it in the soil analysis bag. Take the bag to your local extension office and keep an eye out for the results in the mail.



An example of a well designed soil sample layout; these collections will be combined to create one representative sample.

Interpreting the Results

There are many different types of soil analysis performed by the UGA Cooperative Extension Service. We recommend you get the basic test and pay a little extra for the nitrate analysis and the organic matter analysis. This combination will give a very good indication of what amendments might be needed to improve tree health. The analysis report will be mailed back to your home address. The results will come back with a bar chart that indicates how many pounds per acre of each nutrient are present, what the soil pH is, and how these numbers compare to the requirements of the tree. A written description of recommended actions can be found in the paragraph below the bar chart. These recommendations will tell you how many pounds of fertilizer and lime are needed for every 100 square feet of soil or canopy area.

Amending the Soil

It is very important to note that pH recommendations are based on an application that will be incorporated into the top 6-inches of soil. Since deep soil disturbance cannot usually be done in the rooting area of large trees, it is a good idea to reduce the liming recommendation by 2/3. Crushed or pelletized dolomitic lime are the most commonly available amendments used to raise pH. Occasionally, sulfur may have to be added to lower pH. If this is the case, we recommend you talk with your extension agent before applying sulfur. pH amendments should be evenly distributed across the soil surface. A steel toothed rake, tiller, or air spade should be used to incorporate the amendment deeper into the soil; take care not to damage woody roots over 2-inches in diameter when doing this.

Organic material may also need to be added around urban trees. Organic materials support soil microorganisms that improve soil structure and help return nutrients to a site. Applications of aged composts are the best way to add organic materials around a tree. Compost has already completed much of the decomposition process and will not remove nitrogen from the soil like wood chips or peat moss. Compost should be incorporated into the soil using the same application methods used to add lime. Compost can be added at any time throughout the year.

Soil nutrients are added using fertilizer. Granular, liquid, and injectible fertilizers are commonly promoted for tree care. Granular fertilizers are readily available at nurseries or garden centers. They benefit trees by slowly releasing nutrients into the soil. Granular fertilizers should be evenly broadcast across the soil surface beneath the tree's canopy. Liquid fertilizers help to quickly add nutrients to a site. Unfortunately, if they are not applied properly, they can result in runoff that damages our creeks and streams. Runoff can be reduced if liquid fertilizers are injected into the soil. Some companies claim that soil injections increase the depth of the rooting zone. In our area, root depth is limited by oxygen availability instead of nutrient availability, so there is little correlation between fertilization and root depth. Liquid fertilization soil injections can be an effective way to fertilize trees that have roots below grass or other vegetative ground covers. Liquid fertilizers are much more expensive than granular fertilizers. We do not recommend homeowners ever attempt to use injectible fertilizers on their own. Injectible fertilizers should only be used in very rare and special circumstances where there is no access to the soil around the roots. Consult a Certified Arborist if you require an injectible fertilizer application.

What Do All Those Numbers Mean?

Fertilizer is commonly sold by the pound, but a 50 pound bag of fertilizer does not contain 50 pounds of nitrogen. The numbers on the front of the bag indicate the percentage of nitrogen (N), phosphorus (P), and potassium (K) in each bag. Multiply the bag weight by the percentage to figure out how many pounds of each nutrient are actually supplied by the bag.

50 Pound Bag of 10-10-10 = 5 lbs N, 5 lbs, P, 5 lbs K.

50 Pound Bag of 10-20-18 = 5 lbs N, 10 lbs P, 9 lbs K.

Timing

Lime can be added at any point throughout the year. It takes a couple of months for lime to fully adjust soil pH, so start early if you are preparing a site for planting. Fertilizer timing is a much more sensitive issue. Fertilizer should never be applied in the fall or early winter. Fertilizer stimulates plant growth and growth should never be stimulated when trees are going dormant. Generally, fertilizer should be added in stages. ½ of the required amount should be added in the mid spring and ¼ of the amount should be added two months later and again two months after that. Patience is required when fertilizing urban trees; fertilizer takes a few weeks to become fully available and trees can take a growing season or two to show the benefits of the application.