Leaflets News and Information for the Arborists of Michigan

Photo 1: At a soil pH above 7.0, manganese becomes unavailable to red maple, resulting in the interveinal yellowing symptoms. Other maples such as sugar and silver are usually not as adversely affected by high soil pH.

Photo 2: Pin oaks tend to exhibit severe yellowing with high soil pH. Unlike maple, pin oaks are more sensitive to the unavailability of iron at high pH. The deficiency of iron may even induce severe branch dieback. Other species of oaks are often not as sensitive to high soil pH.

Photo 3: A solubridge (left) and a pH meter (right) are two useful instruments that plant health care providers can use in the landscape or nursery for diagnosis of potential soil related plant problems.

Photo 4: A soil probe is useful for collecting samples of soil for submission to a soil testing lab. In this case, the soil probe has helped to solve a white pine decline issue resulting from several inches of clay soil fill over the natural soil, burying the roots of large pine trees. Note lighter color of fill soil above darker native soil (bottom of probe).

The Plant Doctor's LANDSCAPE TIPS

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SOIL TESTS AND THEIR VALUE

INTRODUCTION:

In many traditional areas of Agriculture, soil tests are routinely performed to maximize plant health, and hence, yields and productivity. By contrast, plant health care providers for nurseries and landscapes frequently apply fertilizer nutrients and amendments without any knowledge of the soil conditions. Serious plant problems may develop from soil conditions that are adverse to the health and survival of the plants we have selected for particular sites. Some of these plant problems result from soil texture, the inappropriate soil pH, and imbalanced or deficiencies/excesses in soil nutrients, to name a few. Soil tests may help us make decisions on which plants to install where, and what nutritional requirements are necessary for maximum plant health. Soil tests may also help us to diagnose specific plant problems.

TYPES OF SOIL TESTS:

Nutrition: Standard soil tests include analysis for the major elements N, P, K (Nitrogen, Phosphorus and Potassium), and for some secondary elements such as Calcium, Magnesium and Sulfur. Usually for an extra charge, it may be advisable to have soil analyzed for specific micronutrients such as Boron, Iron, Copper, Molybdenum, etc., which are needed in very small amounts by plants. With a soil test, we can usually determine what nutrients are deficient or in excess so that corrective action can be taken for optimal plant health.

Soil pH: The pH of soils is a very important for a variety of reasons. Soil pH is a relative measure of the H+ (Hydrogen ion) activity in the soil. Most plants grow in a pH range of 5.0 to 8.0 with around 6.0-7.0 being normal. Specific plants may have an optimum soil pH requirement for best health. Soil that measures above 7.0 is considered to be alkaline while soil measuring below 7.0 is considered acidic. It is easier to raise soil pH with lime than to lower it with sulfur compounds. An important factor related to pH is that some macro and micro nutrients will be more or less available to the plant according to the soil pH. For example, iron and manganese tends to become less available as the pH rises above 7.0 (Photos 1 & 2).

Texture Analysis: As part of a soil test, the soil texture may be analyzed. Soil texture components include clay, silt, sand and organic matter. Textural analysis can help us decide what plants can be properly grown in our particular situation. For example, some plants grow far better in light sandy or sandy loam soils, which tend to provide better drainage and aeration. Other plants may tolerate more poorly drained soils, often associated with larger percentages of clay in the soil makeup. For example, white spruce tends to tolerate heavy clay soils and poorly drained soils better than does Colorado blue spruce. Taxus (yews) do not tolerate poorly drained soils as well as other plants do.

Plant Tissue Tests: Most labs that offer soil tests usually also offer plant tissue analysis. A plant tissue analysis can often reveal various deficiencies of certain macro or micro nutrients, which are usually related directly or indirectly to soil issues such as pH or actual nutrient deficiencies/ excesses and/or imbalances.

Soluble Salts: A test to measure the electrical conductivity or resistance of the soil is often made with an instrument known as a solubridge. Conductivity is often correlated with various salt ions. For example, many fertilizers contain salts (charged particles=ions) of nutrients; so does the common road salt, sodium chloride. Hence, a high solubridge reading may indicate over-fertilization, road salt, water softener discharge or even localized animal urine in the soil. A soluble salts measurement may be a good diagnostic tool to help lead us to the cause of a particular problem (Photo3).

MANAGEMENT OF SOIL/PLANT ISSUES:

To avoid soil related issues in landscapes and nurseries, landscape architects and plant health care providers would be well advised to have soil tests performed *before* any new plants are installed. Soil tests can help us make appropriate plant selections to avoid future plant problems, and hence, expensive and often marginal corrective inputs. In established landscapes, soil tests should be performed every two or three years to monitor nutrition and pH levels, so that proper plant health can be maintained. Recommendations often accompany soil tests results from the lab. Soil tests can also be utilized as important diagnostic aids to solve plant issues (Photo 4). A soil probe, pH meter and a solubridge are three simple instruments that plant health providers can use directly in the landscape and nursery for preliminary plant diagnostics.

The MSU Soil Testing Lab is located at A81 Plant and Soil Sciences Bldg, Michigan State University, East Lansing MI, 48824-1325, Phone (517) 355-0218. Many other commercial and private labs can also perform soil tests.