

S as in Soil...

Re: Optional testing for Routine Soil Analysis

One question I often get is whether or not to include the optional testing on the Routine Soil Analysis order form. The Routine Analysis includes soil pH and nutrient levels, as well as a lead screening, Cation (pronounced CAT-ion) Exchange Capacity, Base Saturation Percentages, and Scoop Density. Lime and fertilizer recommendations are included when requested.

Optional testing for the Routine test includes Organic Matter Percentage (OM), Soluble Salts (SS), and Nitrate (NO₃) analysis. As a general rule, it's a good idea to include all of the optional testing when you are trying to diagnose a problem. Often, if the soil is out of balance in some way, the clues to correcting the situation lie here. The following is a brief description of these three tests, and when you should consider adding them on to your Routine analysis.

Organic Matter: Organic matter consists of decomposing plant and animal matter. It improves soil structure, provides slow-release nutrients as it breaks down, and feeds beneficial soil microbes and earthworms. It helps to stabilize soil pH by increasing the soil's natural buffering capacity.

So, what is a "healthy amount" of organic matter? The answer depends on a couple of factors. First is the soil texture. Soil texture refers to the fineness or coarseness of the particles that make up your soil. Is your soil sandy or loamy, or does it contain a significant amount of clay? A sandy soil feels gritty or coarse to the touch. Loamy soil contains higher percentages of silt and/or clay, and feels smoother. Clay soil feels sticky when wet. Of course, there is a broad range of soil textures, from coarse sands to clays and everything in-between. A general idea of the soil texture is all that is really needed. Sandy soils need more OM, and loamy and clay soils need less.

After you determine the texture of your soil, then consider how you want to use your plot of land. Lawns require less organic matter than gardens. For lawns, 2-4% OM is usually sufficient. For sandy soils, aim for 4%, and for loamy or clay soils, aim for 2-3% OM. Vegetable and flower gardens do best at 5-8% OM. Again, for sandy soils, aim for the top of the range at 8%, while loamy or clay soils require less OM.

Frequently, we see Organic Matter levels well over 8%. Sometimes, this works out fine, but not always. High OM levels may lead to drainage problems (OM holds moisture), excessive nutrient levels (including nitrogen), or a build-up of Soluble Salts, which leads us into our next topic.

Soluble Salts: Soluble salts are dissolved inorganic solutes such as calcium, magnesium, sodium, chloride, sulfate, bicarbonate, potassium, ammonium, nitrate, and carbonate. They are found in most soils, as well as fertilizer and compost. Salts only become a problem at elevated levels. Soils at risk include those that are over-fertilized, contain a large amount of compost, or are contaminated by road salts. Natural causes of elevated soluble salt levels are soils affected by sea spray or brackish water, and salt buildup in arid or drought-affected regions.

When soluble salts are high in soils, plants have trouble taking up moisture and accessing nutrients. Seedlings are more susceptible than mature plants, and some plants are more tolerant of salt buildup

than others. The remedy to high soluble salts is to flush the soil liberally with fresh, clear water. It may take up to 2-4 inches of water to remove damaging salts.

Nitrates: Plants absorb Nitrogen as Nitrate ($\text{NO}_3\text{-N}$) and Ammonium (NH_4^+). These plant-available forms of nitrogen move freely between the soil, water, and atmosphere with changing weather conditions. Because of this fluctuation, we do not include Nitrate testing as part of the Routine Analysis. Nitrate levels reported on test results reflect conditions at the time the soil was collected and are not a good indicator for long-term fertilizer recommendations. Instead, we make recommendations based on what you are growing, which is indicated by the Crop Code listed on your order form.

The Nitrate test is helpful when diagnosing problems, such as little or no available nitrogen (resulting in yellowing leaves, or poor growth), or too much nitrogen (resulting in lush green vegetative growth, but little or no fruit or flower). A nitrate level of 25-30 ppm *during the growing season* is generally sufficient. The challenge is to provide nitrogen when it's needed, that is, when plants are experiencing rapid growth. The most effective way to do this is to split fertilizers containing nitrogen into several smaller applications, spread out over the growing season. Another approach is to use slow release fertilizer or compost to provide nitrogen.

For more information on these and other topics, please visit the Fact Sheet page of our website: <http://ag.umass.edu/services/soil-plant-nutrient-testing-laboratory/fact-sheets>.