Fresh Connections in Urban Agriculture
Digging Deeper Into Soil Health

In any garden, healthy soil sets the stage for plant health and productivity. Soil testing plays a vital role in providing valuable insight into soil quality.

What is Soil?

Soil, by definition from the Soil Science Society of America, is: "The unconsolidated mineral or organic material on the immediate surface of the Earth that serves as a natural medium for the growth of land plants." Healthy soil is key to effective conservation, plant production and maintaining viable conditions for living organisms. All of which are vital to sustainability.

Why it Matters

Soil performs many fundamental functions including but not limited to; serving as a filter for pollutants, cycling carbon, providing a medium for plant life to grow and become productive, controlling water absorption, water direction and helping to regulate and support ecosystems while storing nutrients that plants need.

What Nutrients Are in Soil?

There are *primary* and *secondary* nutrients in soil.

Primary nutrients found in soil are Nitrogen (N), Phosphorus (P) and Potassium (K). Secondary nutrients are Calcium (Ca), Magnesium (Mg), and Sulfur (S).

How Do I Know My Nutrient Levels?

Soil testing is a management tool used to determine levels of all the aforementioned nutrients in your soil. Sampling kits are available at Cortland County SWCD with directions on how to properly collect the soil sample and where to send them to be processed. Your soil analysis will provide levels of nutrients available in the soil and be used by professionals to estimate the amounts supplemental nutrients needed for what you desire to grow.

Calculating Acreage

The amount of soil amending product to apply is usually prescribed in pounds or tons per acre and conversions may be needed. Converting your garden to acreage can be done by measuring the length and width of your garden to calculate the area. Multiply these two measurements to get the area (ft^2). An acre is 43,560ft^2. Divide the area of your garden by 43,560 to get the area in acres. This will be the area that will be used by your local garden store to find the products needed to amend your soil as well as obtain the correct amount of said products.

Amending The Soil

The primary nutrients are listed in percentages in the order of N-P-K on most packaging. Nitrogen can also be replenished in soil by planting legumes. Examples of legume plants are peas, clover, alfalfa, soybeans, and lentils. Increasing phosphorus can be accomplished by distributing rock phosphate at a calculated rate. Potassium can be supplemented by using potash which is hardwood ashes. Keep in mind, wood ash also will increase the soil pH so it is important to re-sample. It also needs to be applied before planting as it leaches relatively easily from the soil.

Manure or compost can also be used to meet the nutrient needs of your soil depending on deficiency levels. A sample can be collected and an analysis can be done to determine nutrient levels in these organic nutrient sources. These products are also useful for buffering pH, increasing soil organic matter and improving overall soil structure.

pH Levels in Soil

pH is a measurement of the soil's acidity or alkalinity. A pH level of 7.0 is neutral. Anything lower than that is considered more acidic, while anything higher than that is considered more basic. The essential nutrients are most readily available to plants at a pH range of 6.0-7.5.

Managing pH Levels

Soil pH that is too high or even too low can directly influence the crop yields. This is partially because soil pH levels that are too high or too low create nutrient deficiencies and is also detrimental to microorganisms that help keep the soil healthy. Some practices to put into place with your garden can help prevent or at least minimalize the fluctuations in pH and optimize yields. The regular use of cover crops (oats, crimson clover, winter rye) in partnership with no-till or minimal till practices will help preserve your soil's integrity. You will notice less fluctuation in soil pH and nutrient levels over time if you use these practices while rotating crops. Crop rotation will prevent specific areas of your garden from becoming nutrient deficient. Regular soil testing is also vital to monitoring and regulating these levels.

In Summary

Creating and maintaining healthy soil is necessary when it comes to having a successful and bountiful garden area. There are macro and micro nutrients in the soil that need to be balanced in order for this to happen. Different plants require different nutrients in different amounts to grow successfully and productively. Soil sampling is an integral part of nutrient management in your garden and amendments cannot be properly added until sample results come back. Once acreage is calculated, the appropriate amounts of amendments can be applied. Healthy soil is key to effective conservation, plant production and maintaining viable conditions for living organisms. All of which are vital to sustainability.

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