



Testing Descriptions 2023

We utilize a variety of testing methodologies to measure the abundance of life in the soil. In measuring the categories of biological functional groups, the totals of each of these groups represent a snapshot of the biological profile at the time of testing. We have found that when performed together, these individual tests represent a comprehensive picture of the overall health and utility of the material tested.

Soil Life Test

Includes: Moisture Percentage, pH, Electrical Conductivity, Total Fungi, Total Bacteria, Biological Carbon and Nitrogen.

Compost Basic

Includes: Moisture Percentage, pH, Electrical Conductivity, Aerobic AND Total Fungi, Total Bacteria.

Liquid Basic

Includes: pH, Electrical Conductivity, Aerobic AND Total Fungi, Total Bacteria.

Add-Ons

Aerobic Fungi/Bacteria for soil, Protozoa

Assay Detail

Moisture Percentage (Dry Weight)

This is a measure of moisture. Used for soils and solid amendments, such as compost, we determine how much of the material is dry matter. A higher number indicates low moisture, while a lower number indicates higher moisture content. Subtracting the Dry Weight from 1 equals the moisture content. *(For example, if your dry weight is reported as 0.80, then your moisture content is 0.20 or may be reported as 20%.)* The ideal range for this number is climate and crop specific.

pH

The pH of the sample, utilizing the saturated paste method.

Electrical Conductivity (E.C.)

The conductivity of the sample, or, how well the ion exchange is working.

Total Fungi and Total Bacteria

Microbial biomass has been shown to be a reliable short-term predictor of accumulation of organic matter, and has great use in evaluating regenerative methods. Reported in $\mu\text{g/g}$.

Living Carbon and Nitrogen

Carbon and Nitrogen reported in $\#/acre$ based on living biomass.

Aerobic Bacteria

Samples are prepared and stained with fluorescein diacetate (FDA is a substrate that binds and fluoresces to the metabolically aerobic bacteria and fungi) and quantified using direct microscopy.

Measuring the Biomass of bacteria in a sample is the first step in understanding the health of a soil and the potential benefit of an inoculum or amendment. Total population of bacteria provides us with an indicator of abundance of food for predators, nutrient cycling capacity and general diversity of the bacterial population. We report this number as $\mu\text{g/g}$ or $\mu\text{g/ml}$ of biomass. The Aerobic population is the component of the Total Biomass that is currently metabolizing oxygen. The relative range of these two numbers varies based on crop type and season. When looking at inoculants the balance between Active and Total is important for two different reasons: In compost this balance needs to be below 10%, indicating a mature and stable material. In liquid inoculums, higher levels are better for a foliar application. This high aerobic activity assists the organisms stick to the plant surface.

For soil application of a liquid, this balance may not be as critical as they will become active in the soil environment.

Aerobic Fungi

Samples are prepared and stained with fluorescein diacetate (FDA is a substrate that binds and fluoresces to the metabolically aerobic bacteria and fungi) and quantified using direct microscopy.

Fungi in the soil play an important role, nutrient retention and transportation, soil structure and its relationship to pH. Plant system succession is directly linked to the ratio of Fungi to Bacteria and is the first area we address when we approach remediation steps. Like bacteria, we report Biomass of Fungi in $\mu\text{g/g}$ or $\mu\text{g/ml}$. Instead of counting individual populations, we measure length and width of fungi present. Reporting this as biomass, we do direct comparisons of Fungi and Bacteria. When we observe and measure fungi we look at 2 primary things: total population and aerobic level (same basic method as Bacteria).

Protozoa - Flagellates, Amoebae, Ciliates

Ciliates, flagellates, and amoebae are enumerated by direct counting of serial dilutions of the sample using microscopy. Estimates of total protozoa are calculated using the most probable number approach.

Our Protozoa method involves creating several dilutions of the sample and then correlating presence and absence of each group to create a Most Probable Number in $\#/g$ or $\#/ml$. Unlike bacteria and fungi, it can take up to 5 days to complete this test. Protozoa are typically single cell organisms that feed upon bacteria. Flagellates and Amoebae are true aerobes, meaning they must have adequate oxygen to survive, while Ciliates are Facultative Anaerobes, meaning they can survive in low oxygen conditions. Numbers of protozoa are very important as an indicator of potential nutrient cycling, if there are sufficient levels of Flagellates and Amoebae then aerobic nutrient cycling can occur. However, high levels of Ciliates can be an indicator that anaerobic nutrient cycling is occurring. We use Ciliates to help identify potential anaerobic conditions in the sample.

Testing and Reports

All of our testing methods are scientifically validated and considered important indicators of soil health and function. We have created a testing menu that consolidates the most efficient use of these methods to distill key data and make informed soil management decisions easier.

We provide reports that indicate the levels of the above measurements found in your sample, and a desired range based on the indicated plant type. These desired levels can be affected by seasonality, agronomic practices, and environmental factors. We offer in-depth

Report Reviews and Consulting to help determine the best approach to remediate potential problems as displayed on your reports.

With over 20 years of working directly with clients – both in the field and through the lab – we have developed an expertise in the practical application of the science behind soil biology. Whatever your circumstance, we can help you achieve your goals of a healthier, more productive soil.

Matthew Slaughter, President

Earthfort, LLC.