



knowledge to grow



## Active Carbon

Active carbon (AC), also known as soil organic carbon, refers to the amount of carbon present in the soil in a form that is readily available for plants and microorganisms to use.<sup>1,2</sup> This form of carbon is important for maintaining healthy soil and supporting plant growth. Organic matter such as leaves, roots, and other plant debris decompose and provide the soil with active carbon.

AC is a crucial component of soil health because it plays a key role in maintaining soil structure, fertility, and water-holding capacity. It also helps to improve soil aeration and promotes the growth of beneficial microorganisms. These microorganisms break down organic matter and release nutrients that are essential for plant growth.<sup>2</sup> The connection between AC and living soil makes it an excellent indicator of biological activity (for example, soil microbial respiration) and the diversity and robustness of the overall soil microbial biomass. In fact, research has established that AC is a good “leading indicator” of soil health response to changes in soil management because small changes can lead to significant, measurable improvements.<sup>3</sup>

Why? Because when a large population of soil microbes is fed plentifully over an extended period of time, well decomposed organic matter builds up. So, monitoring the changes in AC can be particularly useful to gardeners and farmers who are changing practices with the goal of building up soil organic matter.

Unfortunately, the level of AC in the soil can decrease due to human activities such as overuse of chemical fertilizers and pesticides, overgrazing and deforestation. These activities can deplete the soil of its natural carbon, making it less fertile and less able to support plant growth.<sup>1,2,3</sup> Therefore, it's important to maintain or increase the level of AC in the





soil through sustainable, organic, and/or regenerative agricultural practices such as crop rotation, cover cropping, and reducing tillage. These practices can help to improve soil health, increase crop yields and sequester carbon from the atmosphere.

Another benefit of having high levels of soil AC is its ability to help reduce the amount of carbon dioxide in the atmosphere. Carbon dioxide is a greenhouse gas, which means it contributes to global warming. When carbon is stored in the soil in the form of AC, it is removed from the atmosphere and can help to mitigate the effects of climate change.

Soil AC is not only important for plant growth and the environment, but it's also important for human well-being. Healthy soil is essential for producing food, fiber, and other resources. Soil active carbon is an important component of healthy soil, and it is essential for the long-term sustainability of our food systems and ecosystems.<sup>2</sup>



AC is also known as Permanganate-oxidizable Carbon or POXC, and some laboratories refer to the test procedure using the term Reactive Carbon. Different names may be used to describe the test procedure, but they're all investigating and measuring the labile portion of soil organic carbon.<sup>2,3</sup>

We measure AC by reacting soil with an alkaline potassium permanganate solution that has a deep purple color. As the solution oxidizes, it loses some of its color. The loss of color upon reaction is directly proportional to the amount of AC in the soil sample. AC is determined using a spectrophotometer that has been calibrated for precision and accuracy.

### References:

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3. Moebius-Clune, B.N., D.J. Moebius-Clune, B.K. Gugino, O.J. Idowu, R.R. Schindelbeck, A.J. Ristow, H.M. van Es, J.E. Thies, H. A. Shayler, M. B. McBride, D.W. Wolfe, and G.S. Abawi, 2016. *Comprehensive Assessment of Soil Health – The Cornell Framework Manual, Edition 3.1*, Cornell University, Geneva, NY. MORE