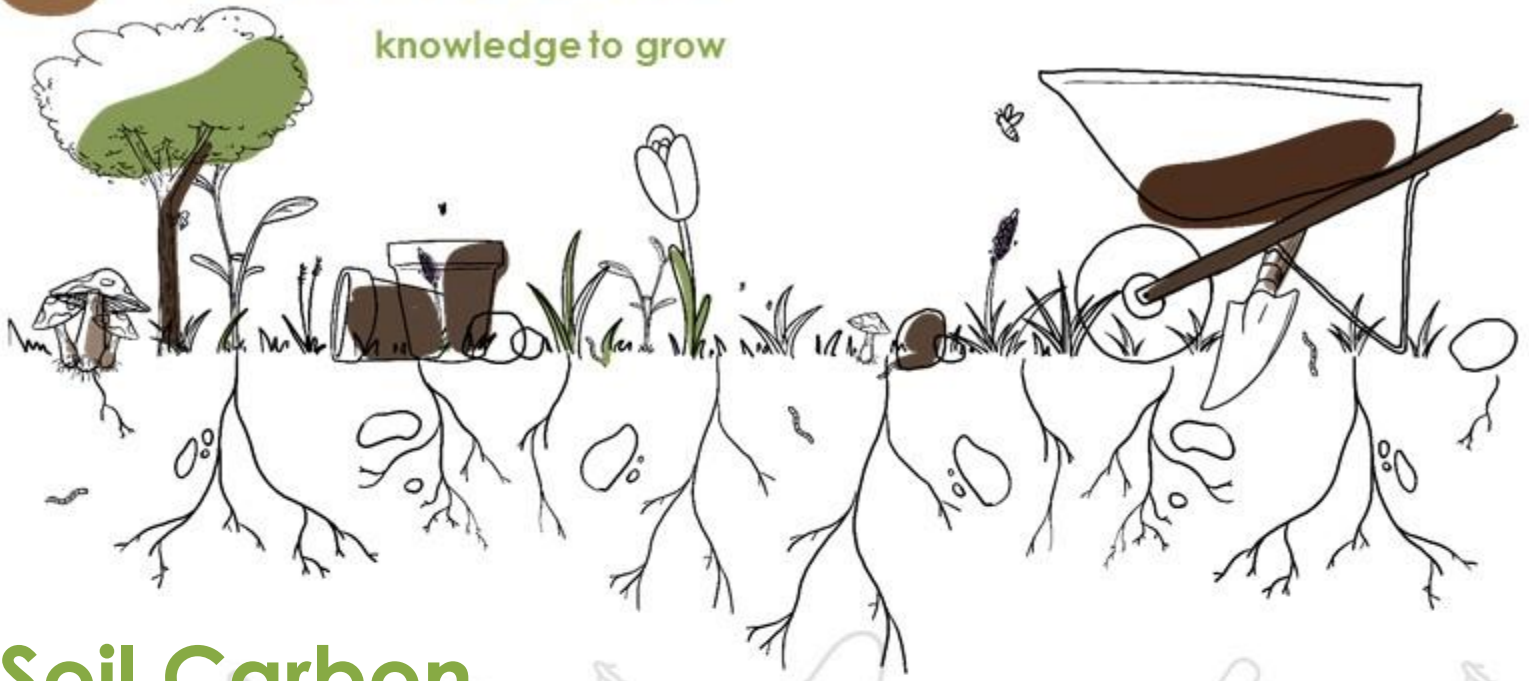




knowledge to grow



Soil Carbon

Soil carbon refers to the organic and inorganic and gaseous forms of carbon cycling in soil.^{1,2,3} It is a vital element for plants as it provides essential nutrients and enhances water-holding capacity. Soil carbon also plays a key role in soil health by improving structure, stability, and fertility. Soil bacteria are also able to take advantage of soil carbon as a source of food. Moreover, soil carbon is becoming increasingly noticed for its linkage to climate change because changes in soil carbon levels can either mitigate or contribute to global warming.

The relationship between soil carbon and climate change is complex, but soil carbon sequestration, or the removal of carbon dioxide from the atmosphere and its storage in the soil, can play a role in mitigating climate change. A study by Lal (2004) found that regenerating degraded soils, such as those that have been over-tilled or stripped of vegetation, can increase soil carbon levels and help to reduce the amount of carbon dioxide in the atmosphere.¹

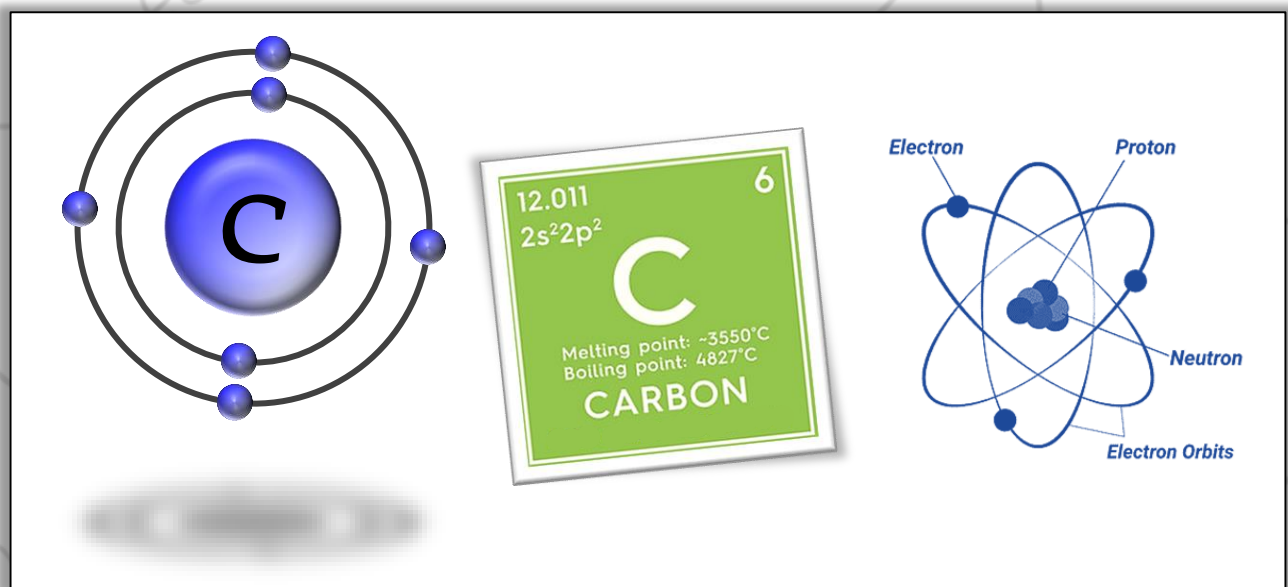
Further studies have concluded that increasing soil carbon can improve plant growth and overall productivity.⁴ The organic matter in soil carbon provides a source of nutrients that are essential for plant growth. Additionally, the carbon in soil helps to retain water in the soil, making it available for plant roots to absorb. This can be especially important in drought-prone regions.

Soil carbon also contributes to soil health by increasing soil stability and reducing erosion. Soils with high levels of organic matter have a higher capacity to resist erosion, which can prevent the loss of valuable topsoil.^{4,5} The improved structure of soil with high carbon levels also enhances its ability to retain water and nutrients, making it more fertile and able to support plant growth and help plants develop greater biomass. It is worth noting that the inorganic forms of carbon in soil such as carbonates do contribute to soil structure and texture but are not accessible by soil bacteria as a source of food.

Today the impacts of climate change that once seemed like some avoidable nightmare have become a stark reality. Although it is the direct emissions of greenhouse gases (GHG) into our atmosphere that is creating the most drastic climate changes, the changes in soil carbon levels do contribute to global warming. When soil organic matter is oxidized, carbon dioxide (CO₂) is released into the atmosphere.



The process, known as soil respiration, can be significant, especially when large areas of land are disturbed, such as through deforestation or tillage. This release of CO₂ can contribute to the greenhouse effect and contribute to global warming.⁵



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