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Soil: The Hidden Hero in Fighting Climate Change

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When we think about climate change, we often imagine smokestacks, vehicles, or melting glaciers. But beneath our feet lies an unexpected hero **soil**. Quietly and invisibly, soil has the power to capture and store carbon, helping reduce carbon dioxide (CO₂) in the atmosphere. This process, known as soil carbon sequestration, begins when plants absorb CO₂ through photosynthesis and transfer it into the soil as organic matter. Today, scientists and farmers alike are turning their attention to the soil—not just as a medium for crops, but as a powerful tool to restore the environment and improve agricultural productivity.

Farming Practices that Build Carbon

One of the simplest ways to increase soil carbon is by changing how we farm. Traditional ploughing disturbs the soil and releases stored carbon back into the atmosphere. In contrast, **conservation agriculture**, which includes reduced tillage and leaving crop residues on the field, helps keep carbon locked in the soil. Studies have shown that such practices can significantly increase soil carbon stocks while reducing emissions. When farmers avoid burning crop residues and instead leave them on the field, those plant materials slowly decompose and become part of the soil organic matter essentially turning waste into wealth.

Feeding the Soil with Organic Matter

Just like humans need nutritious food, soil needs organic matter to stay healthy. Adding compost, farmyard manure, and vermicompost enriches the soil with carbon and nutrients. These materials not only improve soil fertility but also enhance its ability to store carbon. Among these, **biochar** a charcoal-like substance made from plant material has gained popularity. It is highly stable and can remain in the soil for hundreds of years, acting as a long-term carbon reservoir. Organic amendments like compost and biochar are now recognized as key tools in carbon farming because they directly increase soil carbon storage while improving soil health.

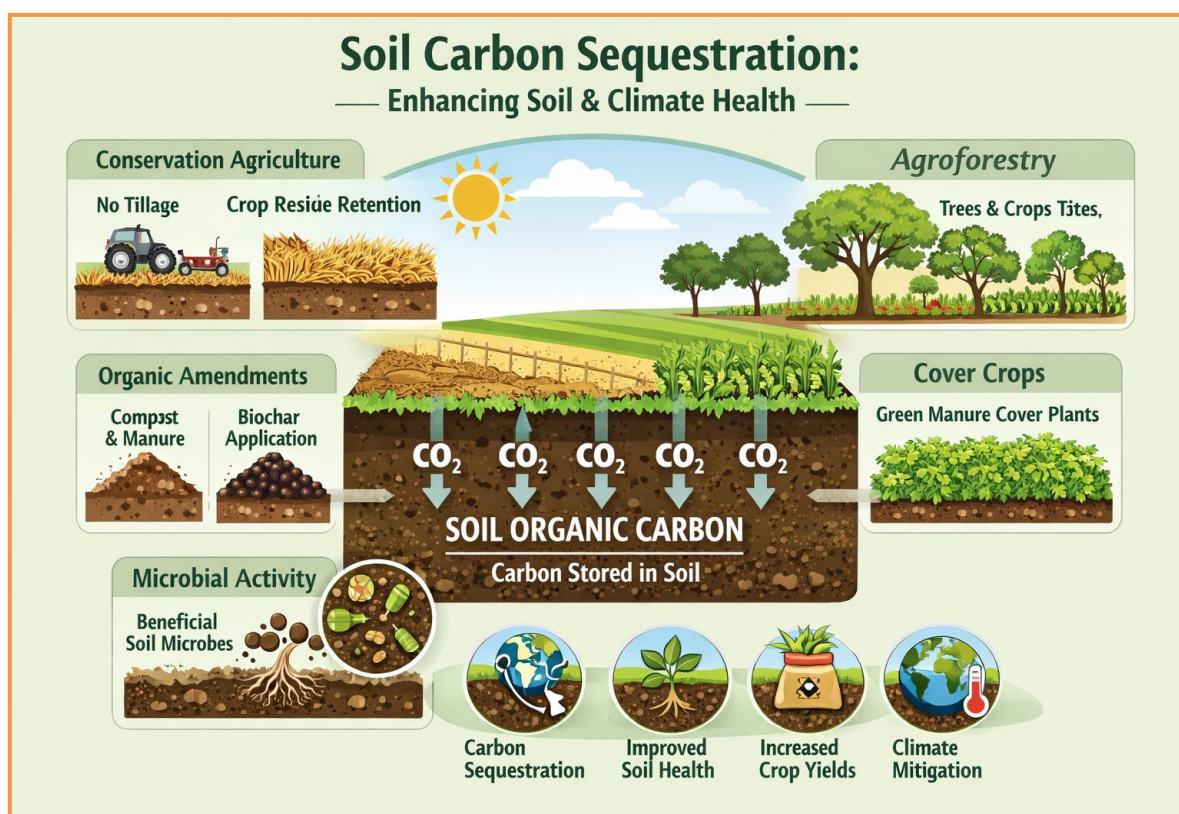
Growing More Than Crops: The Role of Trees

Trees are natural carbon collectors. When integrated into farms through **agroforestry**, they not only provide fruits, fodder, and timber but also add large amounts of carbon to the soil through leaf litter and roots. Deep-rooted trees even push carbon deeper into the soil, where it is more stable and less likely to escape back into the atmosphere. This makes agroforestry a win-win solution helping farmers diversify income while strengthening the environment.

Cover Crops: Green Shields for the Soil

What happens to the land when crops are not growing? In many fields, it lies bare exposed to erosion and carbon loss. But farmers are now using **cover crops** to protect and enrich the soil during these periods. These crops, often legumes, grow quickly and cover the soil surface, preventing erosion and adding organic matter. When they are incorporated into the soil, they act as natural fertilizers, boosting both soil fertility and carbon content. Research shows that

practices like cover cropping and organic amendments can significantly increase soil carbon levels and improve overall soil health.



The Power of Soil Microbes

Beneath the soil surface lives a vast community of microorganisms bacteria, fungi, and other microbes that play a crucial role in storing carbon. These tiny organisms break down plant residues and transform them into stable forms of carbon. Some even produce substances that bind soil particles together, protecting carbon from being released. Healthy soils with active microbial life are better at capturing and holding carbon, making biology just as important as farming practices.

A Climate Solution Beneath Our Feet

Soil carbon sequestration is more than just a scientific concept it is a practical solution to some of the biggest challenges we face today. By adopting simple practices like reduced tillage, adding organic matter, growing cover crops, and integrating trees, farmers can turn their fields into carbon sinks. Experts estimate that agricultural soils worldwide have the potential to store vast amounts of carbon each year, making them a key part of climate mitigation strategies.

From Soil Health to Farmer Wealth

Beyond environmental benefits, improving soil carbon also makes economic sense. Healthy soils retain more water, require fewer chemical inputs, and produce better yields. This means lower costs and higher profits for farmers. In fact, soil carbon sequestration is increasingly being linked to carbon credit markets, opening new income opportunities for farming communities.

The Way Forward

The future of agriculture lies not just in increasing production, but in sustaining the very soil that supports it. Soil carbon enhancement offers a pathway to achieve both feeding the world while healing the planet. The next time you walk on soil, remember: beneath your feet lies one of the most powerful climate solutions we have.

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