

HEALTHY GARDEN

Carbon fixation

Carbon capture in gardens is important for our ecosystem as it helps reduce the greenhouse effect.

Not only can plants fix carbon, but soils can also do the same. — ALEXANDER FOX/PlaNet Fox/Pixabay

By **ARINA SHAIRAH ABDUL SUKOR**

PLANTS have the amazing ability to fix carbon from the atmosphere and store it in their structures. This process, known as carbon fixation, is fundamental for life on Earth. It forms the basis of most food chains and helps regulate the amount of carbon dioxide in the atmosphere.

But what exactly is carbon fixation? It is the process by which plants convert inorganic carbon (in the form of carbon dioxide) from the air into organic compounds, such as sugars and starches. The process of carbon fixation in plants is commonly known as photosynthesis.

Using sunlight as an energy source, plants take carbon dioxide from the air through their leaves, and water from the soil through their roots. These components are then converted into glucose (sugar) and oxygen. Plants use this glucose to grow, incorporating the fixed carbon into various parts of their structure.

Plant biomass, in which this fixed carbon is stored, can be divided into two categories:

Aboveground biomass: This includes all parts visible above the soil, such as leaves, stems, branches, flowers and fruits.

Belowground biomass: This comprises the hidden parts beneath the soil surface, primarily the roots and tubers.

Interestingly, studies have shown that, as atmospheric temperature increases, plants increase their efficiency in allocating fixed carbon to plant biomass. This means that plants may become even more effective at capturing and storing carbon as our climate warms.

Soil as a carbon bank

Not only can plants fix carbon, but soils can also do the same. In fact, soils contain three times more carbon than the atmosphere. Soil carbon sequestration is a process in which carbon dioxide is removed from the atmosphere and stored in the soil carbon pool. Good management to maintain a regenerative gar-

den can potentially increase the capacity of soil to store carbon over time. The carbon balance in the soil is often influenced by soil microbial activity on soil respiration and the decomposition rate, which is related to temperature.

Our country is in the tropical region with a hot and humid climate throughout the year. The fluctuation of environmental variables due to climatic factors accelerates the decomposition rate of soil organic matter. The soil microbial community feeds on carbon as their food source for energy to decompose complex organic matter in the soils into simple forms of plant-available nutrients for plant uptake.

Capturing carbon in your garden

As home gardeners, we often reach for a hoe or spade to disturb the soil for weed removal or fertiliser application. Please consider discontinuing this practice. In regenerative gardening, we emphasise the minimisation of soil disturbance. Regenerative gardening practices, which adapt

to the no-till or no-plough approach, improve soil health and provide better water retention than conventional gardening with disturbed soil structure.

Practising an integrated gardening system by diversifying crop rotation in your garden can potentially fix carbon and provide a diversified range of fresh harvests. Home gardeners can try to include legumes, such as peanuts and soybeans, with other leafy greens or fruiting plants, such as sweet corn or cherry tomatoes, between the gardening cycles.

According to a scientific journal report based on a six-year study (2016-2022), crop rotations stimulate soil microbial activities, increase soil organic carbon by 8%, and enhance soil health by 45% owing to active nutrient recycling in the soil.

Enhancing the combination mix between annual and perennial plants can be another indirect approach for capturing carbon in your garden. A recent study in 2024 reported that growing vegetables, ornamental plants, fruit trees and kitchen

herbs within the garden space enhanced soil carbon sequestration and maintained soil function from 0 to 200cm soil depths.

Importance of carbon capture

By practising regenerative gardening approaches, we are joining the effort to mitigate climate change from the microscale of our backyard home garden.

Carbon capture is important for our ecosystem because it helps reduce the greenhouse effect, which is a major contributor to global warming. Effective carbon capture can stabilise environmental conditions, sequester soil carbon via carbon fixation from plants through the root system, decompose organic matter, and boost nutrient availability for plant uptake during this era of climate change.

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