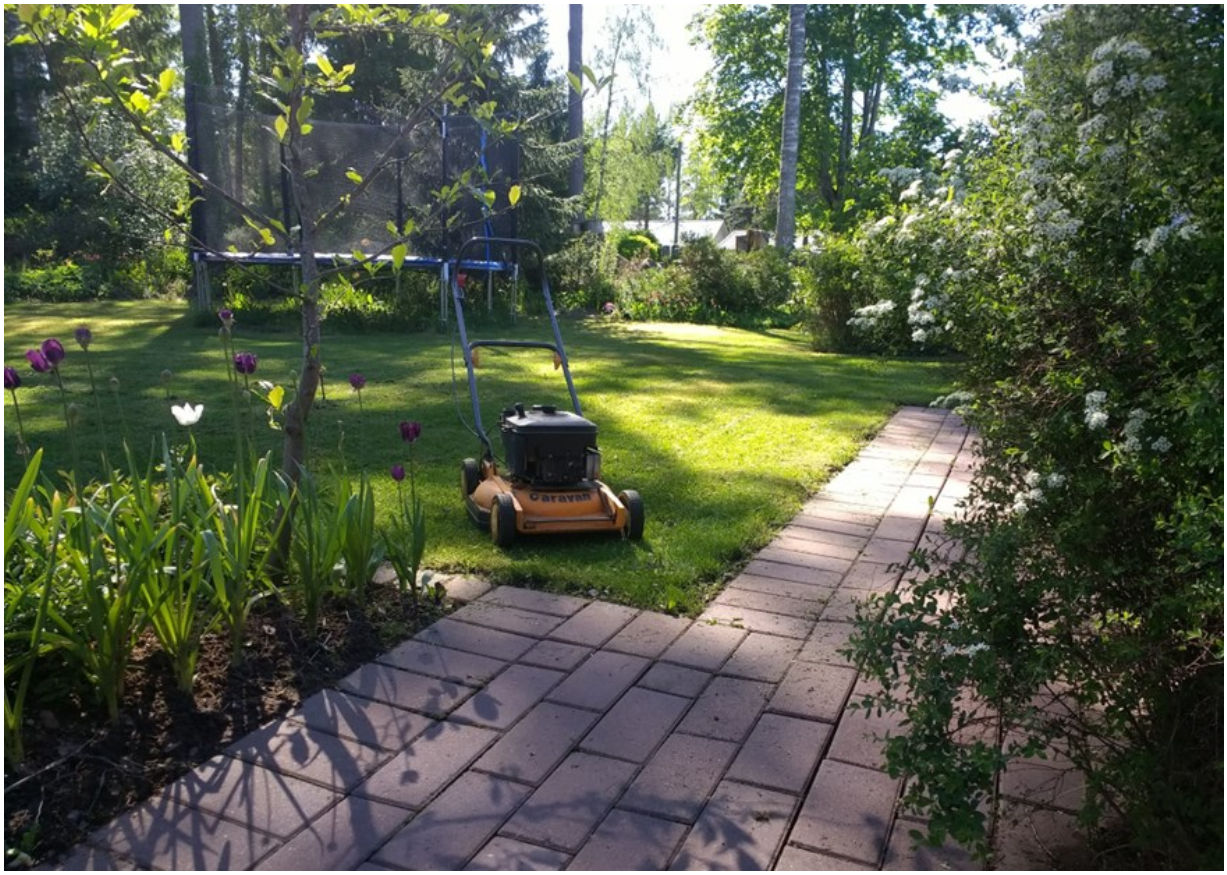
HOME YARD CARBON GARDENING



co-carbon

HOME YARD CARBON GARDENING

Carbon gardening refers to all activities that can improve the carbon sequestration and storage of vegetation in the yard. Individual yards do not make a big difference, but small houses cover a significant proportion of urban land area.

The information in this booklet is based on scientific knowledge produced in the CO-CARBON project and the practical experiences of Finnish home gardeners in 2021–2023. Although the booklet is designed for the needs of private homeowners, it can also be used in the yards of housing cooperatives and commercial buildings. The booklet explains six elements of carbon gardening related to vegetation that are accessible to all residents and gives maintenance recommendations.

The booklet will give ideas on how, with only small changes, an ordinary yard could be turned into a yard that sequesters and stores carbon.

Six key elements of carbon gardening:

1. **Permeable surfaces**
   Where are the water-permeable, plant-covered surfaces in the yard?
2. **Multi-layered vegetation**
   Are there areas in the yard where trees, bushes and ground-covering plants grow together?
3. **Living soil**
   Is there room in the yard for worms and other important soil organisms?
4. **Covered soil surface**
   Where are the areas in the yard that are regularly raked and weeded?
5. **Twigs, leaves, and shredded grass**
   Where does the organic matter of the yard end up?
6. **Multipurpose vegetation**
   How many different tasks do plants have in the yard? Can they also participate in carbon sequestration?

1. PERMEABLE SURFACES

The permeable, plant-covered surfaces of the yard form a connection between soil, vegetation, and air. Permeable surfaces enable the circulation of carbon, nutrients, and water through vegetation and allow soil-air interaction and water absorption. Impermeable surfaces, such as asphalt and dense pavement, break the connection.

FACTS	SOLUTIONS
Permeable surfaces allow water and carbon to move between the soil and the atmosphere.	Prefer permeable surfaces in the yard, such as plants and lawn, and stone ash or permeable pavement on walkways.
Living vegetation binds atmospheric carbon and creates habitats for many organisms.	Prefer permeable surfaces, especially surfaces covered with plants. Lawn is a better option than a terrace.
Impermeable surfaces do not absorb rainwater, which may cause flooding.	Direct the rainwater generated on the plot to the plants. Collect water from roofs to barrels to be used as irrigation water.

2. MULTI-LAYERED VEGETATION

Plants take carbon dioxide from the atmosphere through their stomata in the leaves and needles. The more leaf surface area there is in the garden, the more carbon dioxide can be bound from the atmosphere. Multi-layeredness means a planting area that combines trees, bushes, and ground cover plants of different heights.

FACTS	SOLUTIONS
Multi-layered vegetation increases carbon sequestration.	Which of the current plantings in the yard you could have more layers? Plant for example bushes under the trees or plant small trees in the perennial bed.
In addition to multi-layered vegetation, the carbon garden can also accommodate open spaces.	Use multi-layered vegetation on the edges of the plot as shading and wind and vision protection. Keep for example a playing field and beautiful views open.
The root systems are also multi-layered. The carbon reserves of the soil depend on the dimensions of the root system.	Favor different forms of root system, such as deep and surface roots and plants with thin and thick roots. Ask seedling vendors for more information.

3. LIVING SOIL

Small organisms in the soil, such as microbes, are part of the carbon cycle. Micro-organisms convert organic carbon into a permanent part of the soil's carbon storage, while releasing carbon back into the atmosphere through respiration. Plant cover, a diverse root system, organic fertilizers, and adequate moisture provide a good habitat for soil micro-organisms.

FACTS	SOLUTIONS
Organic matter is the "food" for the soil's microbiome.	Fertilize with compost and animal manure, use organic mulches.
The soils's microbiome can suffer from the use of pesticides.	Avoid chemical control of weeds and pests.
The soil's microbiome also needs oxygen.	Avoid driving heavy machinery and storing goods in vegetated areas of the yard so that the soil does not become compacted.

4. COVERED SOIL SURFACE

The open soil surface does not sequester atmospheric carbon. The bases of plantations, hedgerows, and rose gardens have been typically kept open. The care of vegetable garden has also been based on open topsoil, for example by weeding row gaps and turning the soil in autumn.

FACTS	SOLUTIONS
Reducing the open soil surface increases carbon sequestration and protects the soil surface from excessive heat and drought.	Plant ground cover plants on perennial plant beds and use organic mulch in the vegetable and rose gardens.
Evergreen vegetation photosynthesizes year round. In addition, vegetation protects the soil from erosion.	Maintain plant cover for as long as possible in the fall, even throughout the winter. Cut the perennials only in the spring.
Strong cultivation of the soil can accelerate the decomposition of organic matter and disturb for example the habitat of worms and microbes.	Avoid unnecessary cultivation of the soil and raking of the soil surface. If you have to turn the soil, do it only in the spring.

5. TWIGS, LEAVES AND SHREDDED GRASS

Carbon stored in different parts of the plant should not be removed from the garden. Dead parts of trees and shrubs and softer growth from the same year decompose at different rates, so they can be used in different ways in the yard. A composter is not always needed to recycle biomass on-site.

FACTS	SOLUTIONS
The carbon bound to the vegetation is part of the yard's carbon storage only if it is stored on the plot as twigs and litter.	Don't waste your yard's carbon reserves by burning them, taking them to the edge of a park or transporting them to the waste station.
The same year's growth, such as shoots and grass, contain nitrogen and will decompose quickly.	Chop the plant parts and use them as mulch. The mulch cover reduces the evaporation of moisture from the ground, prevents the growth of weeds and topsoil erosion, and feeds soil organisms.
About half of the dry weight of dead plant parts, such as twigs and branches, is carbon and it can be used in the yard in many ways.	Use twigs as compost bedding and organic mulch or build decaying fence out of them.

6. MULTIFUNCTIONAL VEGETATION

Garden plants have different functions. Multifunctionality means combining different functions in a single plant. Plants can act as space dividers, screens, ramp binders, decoration, and useful plants in the yard. At the same time, they provide ecosystem services, one of which is carbon sequestration. Carbon sequestration works best when vegetation is thriving.

FACTS	SOLUTIONS
The multifunctionality can be seen as many tasks of an individual plant and as the abundant ecosystem services of the entire area.	By changing the maintenance practices of the planting areas in your yard (such as the border fence, hill cover, flower beds), you can make them sequester and store carbon better than they do now.
In the carbon garden, effective carbon sequestration is ensured for all plants, no matter what other task they have.	Ensure good plant growth, sufficient growth space and a long lifespan with the right plant selections and appropriate care for the species.
The yards of the small houses are part of the green structure of the whole city. The choices made in the yard affect the carbon balance and biodiversity of the area.	Take care of the yard in a carbon-smart way and at the same time choose species that support biodiversity.

More information: cocarbon.fi

Text and photos:
Outi Tahvonen / Häme University of Applied Sciences, Finland
outi.tahvonen@hamk.fi

Project leader:
Prof. Leena Järvi / University of Helsinki
leena.jarvi @helsinki

Publication year: 2023

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

HAMK
Häme University
of Applied Sciences

Aalto University

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

UNIVERSITY OF
COPENHAGEN

strategicRESEARCH