

By leaving garden waste alone, Danes could store 600,000 tons of carbon dioxide per year

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Danes shuttle nearly a million tons of garden waste from their gardens every year. But we would be doing the climate a great service if we just left it alone, according to the calculations of University of Copenhagen

professor Per Gundersen. At the same time, leaves and other garden waste are a boon for backyard biodiversity and soil.

Come fall, the sound of a leaf blower blasting leaves into piles, or the sight of a queue of garden [waste](#)-packed trailers at the recycling center is all too common, as trees shed their golden brown and yellow robes.

For the most part, Danes are happy to "tidy up" their gardens. Ministry of Environment figures report that Danes disposed of 983,000 tons of garden waste in 2019, all of which is transported, sorted and processed by municipal waste management systems. The largest branches and trunks are burned for bioenergy, while small branches, leaves and grass clippings are composted.

But perhaps we should leave more of our garden alone. According to Per Gundersen, a professor of forest ecology at the Department of Geosciences and Natural Resource Management at the University of Copenhagen, there are large CO₂ savings to be made. Professor Gundersen calculated the implications for Denmark's national climate account if Danes simply allowed garden waste to decompose in their gardens instead of burning it.

"If everyone went all-in and learned how to manage their garden's branches and twigs, for example, my calculations suggest that we could store about 600,000 tons of CO₂ annually," he says.

The calculations are based on a simple model that includes the different decomposition processes for leaves, twigs and branches.

When Gundersen deducts the utility that branches and trunks used for bioenergy in the current system provide, the CO₂ storage potential of garden waste could meet about half of one percent of Denmark's 70 percent reduction target for 2030.

"When garden waste is burned or composted by municipal waste schemes, CO₂ is returned to the atmosphere very quickly. By keeping waste in the garden, the decomposition process is significantly slower. In practice, this means that one builds up a larger and larger storage of CO₂ in the garden in the form of twigs, dead branches and leaves that are left to decompose," says Professor Gundersen.

Autumn leaves are good for the garden and biodiversity

Leaves are flying about and filling up yards at this time of the year. But instead of raking them up and hauling them off to a recycling center, there are other great reasons to leave them in the yard.

"Leaves help nourish the garden as they feed an entire ecosystem of decomposers. From fungi, bacteria and tiny, invisible soil creatures to earthworms and roly poly bugs, which help break down and metabolize [organic material](#) so that nutrients are released into the soil. These decomposers then act as important food source for larger animals like hedgehogs and birds," explains Per Gundersen.

As microorganisms, worms and other decomposers wage war on the leaves, a large part of the biomass ends up as CO₂ that is slowly released into the air over several years. A small portion of the gnawed leaves becomes soil humus, a common name for the complicated organic material that takes a very long time to decompose and is of great importance for plant health.

"A high humus content in topsoil makes for a dark soil that has a good structure and retains water and nutrients well, which is important if you want garden plants to thrive," says Per Gundersen.

Facts

- According to figures from the Danish Ministry of Environment, Danes disposed of 983,000 tons of garden waste in 2019. This figure includes garden waste from businesses and parks.
- The garden waste is extracted CO₂ from the atmosphere. Converted, this amount corresponds to about 1.2 million tons of bound CO₂.
- If Danes kept their garden waste in their yards and deducted the amount of garden waste used for bioenergy, about half of one percent of Denmark's 70 percent reduction target for 2030 could be met.
- Leaves consist largely of the gas CO₂. Minerals taken up into the soil account for less than 5% of a leaf.
- Leaves are small CO₂ stores that absorb CO₂ from the air and release some of it while decomposing.
- Leaves take 3-6 months to decompose, until half are left (their half-life), while twigs and branches take 2-5 years. Tree trunks decay over 10-20 years.
- Find inspiration for managing 'yard waste' on the Facebook page 'Klimahaven'

We must dare to let go of control

But what to make of all those leaves suddenly filling up the garden? Per Gundersen suggests raking them into planting beds where vegetables are grown, or over to areas where you want to avoid weeds. They can also be gathered in a part of the garden that you may be willing to let grow wild and manage itself.

"Funnily enough, while the wind tends to blow leaves around the garden, they often remain in beds or around bushes where there is less wind,

which is a good thing," he says.

By spring, a large portion of the leaves will have already disintegrated and returned into the invisible garden cycle. Leaves from linden and ash trees are especially good at disappearing quickly from gardens. Oak and fruit tree leaves are slower to break down, making them ideal for soil insulation around bulbous plants or vegetables, for example.

"Our gardens can contribute to both the climate and biodiversity crisis by harnessing more garden waste. I also think that it will lead to a little less gardening in the long run. And then it's more fun, because there will be a greater abundance of life around the [garden](#). We just need to dare to let go of control and make more room for nature by allowing for twigs and a few dead branches, for example," concludes Per Gundersen.

More information: Full report (in Danish): [ign.ku.dk/ansatte/skov-natur-biomasse/?pure=da%2Fpublications%2Fberegning-af-co2lagring-i-haveaffald\(8311570e-8e72-4083-8453-389e0f6721e0\).html](https://ign.ku.dk/ansatte/skov-natur-biomasse/?pure=da%2Fpublications%2Fberegning-af-co2lagring-i-haveaffald(8311570e-8e72-4083-8453-389e0f6721e0).html)

Provided by University of Copenhagen

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