

July 12<sup>th</sup>, 2021



---

### Hedgerows can help to mitigate climate change

***A new study of the Thünen Institute shows the large potential of newly planted hedgerows to sequester carbon***

A 720-meter hedgerow newly planted on cropland can offset the entire greenhouse gases emitted by an average German that are emitted in 10 years. This is shown by a new meta-study, carried out by the German Thünen Institute of Climate-Smart Agriculture in Braunschweig. By storing carbon in the biomass of the hedgerows and as organic matter in the soil, new hedgerows can absorb carbon dioxide (CO<sub>2</sub>) from the atmosphere and make it climate neutral.

"For the calculations, we compiled all available empirical data on soil organic carbon and biomass of hedgerows – a total of 13 studies plus our own data from almost 150 hedgerows," says Sophie Drexler, research associate at the Thünen Institute. The researchers were surprised: On average over many years, almost as much carbon is sequestered in a hedgerow per hectare as it is in forests. This can be explained by the high biomass density of hedgerows and the good growing conditions in the agricultural landscape. A particularly large amount of carbon is also stored in the below-ground biomass of hedgerows. In the last 70 years, however, almost half of all hedgerows in Germany have been removed, mostly in the framework of re-parcelling measures.

In Germany, about 12 % of total greenhouse gas emissions come from agriculture and soils used for agricultural purposes. The largest share of these greenhouse gases is emitted as methane from the digestive tract of cattle and as nitrous oxide from the fertilisation of fields and grassland. Many of these emissions are difficult or impossible to avoid because they originate from biological processes. In addition, large amounts of carbon dioxide are emitted through drainage of peat soils for agricultural use. Therefore, climate neutrality in the agricultural sector is only achievable if emissions are offset elsewhere. Hedgerows can contribute to this. For example, a municipality with 5,000 inhabitants can compensate ten years of greenhouse gas emissions associated with milk consumption, by planting six hectares of hedgerows and field copses.

---

#### **Thünen Institute**

Federal Research Institute for Rural Areas, Forestry and Fisheries  
Bundesallee 50  
38116 Braunschweig  
[www.thuenen.de/en/](http://www.thuenen.de/en/)

Public Relations Officer:

Dr. Michael Welling

Phone: +49 (0)531-596 1016

Fax: +49 (0)531-596 1099

[pressestelle@thuenen.de](mailto:pressestelle@thuenen.de)

## **Only newly planted hedgerows have a positive effect on the climate**

Hedgerows have the greatest effect for climate change mitigation when they are planted on cropland. Because here, additional carbon is stored not only in the biomass, but also in the soil as organic matter. However, it is only newly planted hedgerows that influence the climate, because with their increasing biomass they increase carbon storage in the landscape. This carbon storage effect can therefore only be accounted for once, even if it takes about 20 years for a hedge to grow up. In the soil, it can take even longer for the increased soil organic carbon stocks to reach a new equilibrium.

Besides the climate change mitigation effect, hedgerows protect the soil from wind erosion and have a cooling effect. A summer drought causes less damage in an agricultural landscape with a high cover of hedgerows. Many animals and plants also benefit from hedgerows, which serve as habitats, and step-stones between biotopes. "Due to their diverse functions, hedgerows are important structural elements in the agricultural landscape," says project leader Axel Don. Nevertheless, there has hardly been any new planting of hedgerows in Germany in recent decades. The scientists at the Thünen Institute see several reasons for this. One reason are the various existing programs and subsidies that can be overwhelming for landowners and farmers. In every German federal state there are different schemes with different requirements and offers. It is also not enough if only the planting of hedgerows is supported. The maintenance of hedgerows must also be included in the funding. Landscape management associations, some of which already offer "turnkey" hedges, can help. In addition, hunting associations have long been advocating a more diverse agricultural landscape.

## **Longevity has pros and cons**

The new study could give such initiatives a boost. For the first time it is now possible to quantify the climate change mitigation effect of new hedgerows. Axel Don is convinced: "There is hardly any other climate change mitigation measure in the agricultural sector that can achieve so much effect on so little area." There are already first companies that want to achieve carbon neutrality of their production by planting hedgerows. But why does this mostly remain just a plan? Axel Don sees the longevity of the structural elements as a stumbling block. Hedgerows are under protection and, once planted, cannot be removed easily. This has the advantage that carbon sequestration and the climate mitigation effect would hardly be lost. However, landowners would lose flexibility – and so far, it is unclear whether new hedges continue to be considered agricultural land and thus remain eligible for subsidies.

Furthermore, there is a lack of marketing opportunities for the biomass resulting from hedgerow maintenance. Hedgerows must be trimmed regularly and coppiced every 8 to 12 years to maintain their function. The study of the Thünen Institute calculates that the climate change mitigation effect of hedgerows could even be increased by using the hedgerow biomass as a renewable energy source, e.g. as wood chips for heating purposes. At the moment, however, there are no corresponding regional utilisation concepts. Instead, wood chips are imported from all over the world. The study proves: Only 0.3 % of current agricultural land in Germany would be needed to replant the hedgerows that have been cleared in the last 60 years. This would enrich the agricultural landscapes and at the same time it would sequester 10 million tonnes of CO<sub>2</sub> for climate change mitigation.

**Contact:**

Dr. Axel Don

Thünen Institute of Climate-Smart Agriculture, Braunschweig

Phone: +49 531 596-2641

Mail: [axel.don@thuenen.de](mailto:axel.don@thuenen.de)

**Publication:**

Drexler, S., Gensior, A. & Don, A.: Carbon sequestration in hedgerow biomass and soil in the temperate climate zone. *Reg Environ Change* 21, 74 (2021). <https://doi.org/10.1007/s10113-021-01798-8>



*Investigation of a hazelnut hedgerow near Nienburg/Saale, Saxony-Anhalt (© Thünen-Institut/Sophie Drexler)*