

# Sequestering carbon by planting hedgerows

## Research summary



UNIVERSITY OF LEEDS

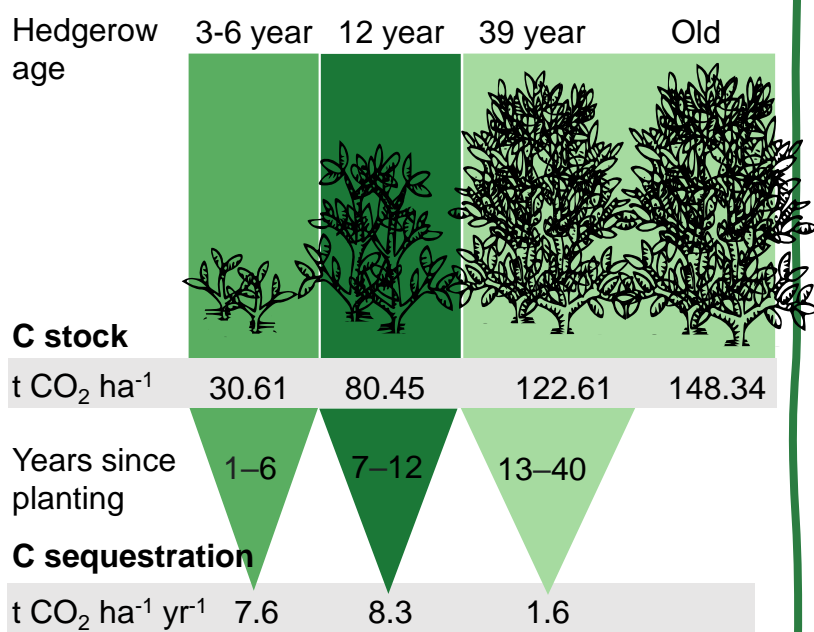
Carbon sequestration by vegetation and soil is an essential part of addressing climate change and achieving net-zero commitments. In the UK, the Climate Change Committee has proposed that extending hedgerows by 40% will help reaching net-zero carbon by 2050.

In England's arable and grassland landscapes, this would require the planting of ~193,000 km of new hedgerows, which equates to about half the length of the UK's road network. More recently, DEFRA has announced its goal of planting 72,500 km of hedges throughout the country by 2050.

This raises two important questions for climate change mitigation planning:

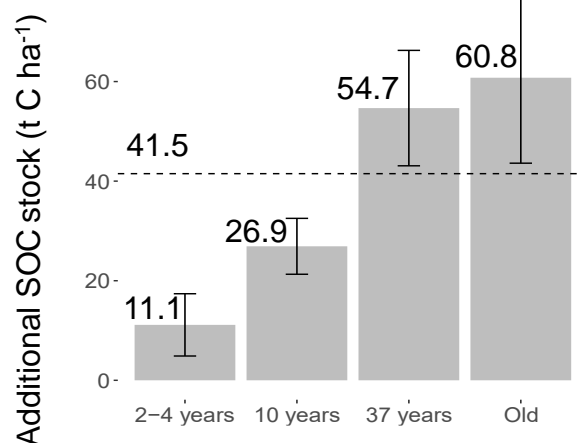
## What is the annual CO<sub>2</sub> sequestration rate of a hedge?

### Aboveground biomass (AGB)



- Biomass C stock increases with age
- Sequestration rate decreases over time
- Management essential in maintaining AGB stock

### Soil organic carbon (SOC)



- +31% SOC stock beneath hedges compared to improved grassland at 0-50cm depth
- Build-up of SOC over time
- SOC sequestration = 5.43 t CO<sub>2</sub> ha<sup>-1</sup> annually for ~40 year old hedges.

These numbers were obtained from sampling biomass and soil of hedgerows dominated by hawthorn and blackthorn in Cumbria.

**Suggested citation:** Biffi, S., Pippa, P. J., Grayson, R. P., Ziv, G. 'Sequestering carbon by planting hedgerows.' University of Leeds School of Geography Briefing Note Series. Available at: <https://www.resilientdairylandscapes.com/publications>

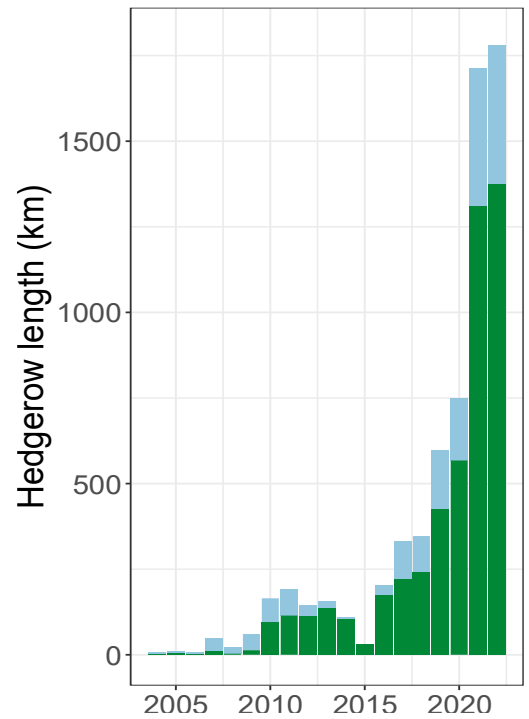
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# What is the CO<sub>2</sub> sequestration potential of planting hedgerows?

The agricultural sector is not the largest producer of CO<sub>2</sub> emissions in the country, but it is responsible for an estimated 5.6 Mt of CO<sub>2</sub> emissions every year. Planting hedges can contribute towards offsetting these emissions, while providing food and habitat for farmland biodiversity, offering shelter for livestock, and increasing overall climate change resilience on farms.

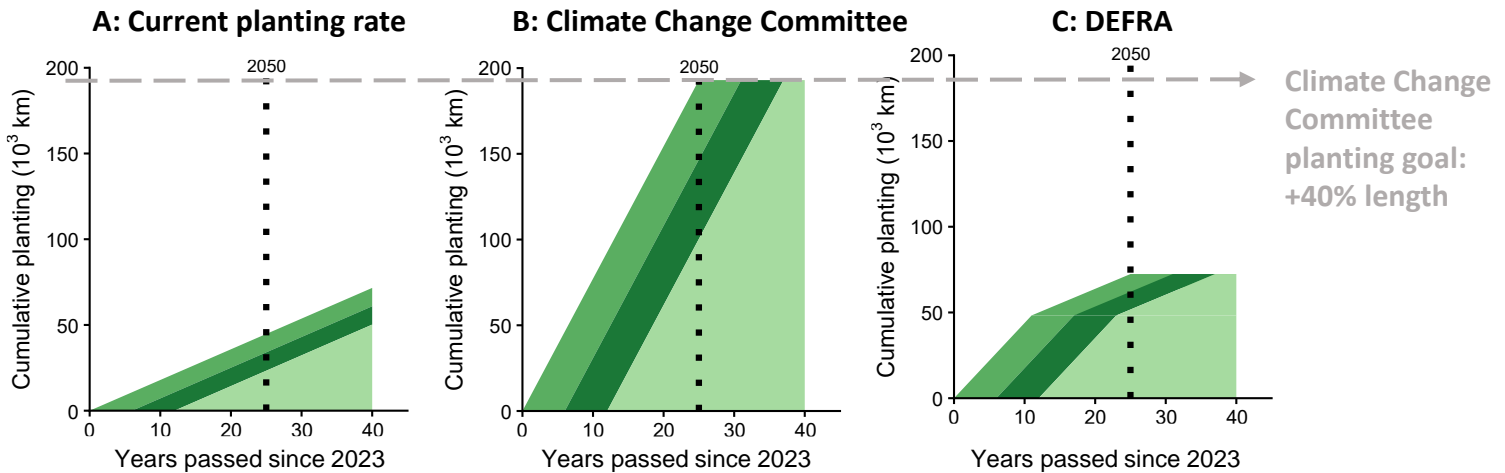
We found that planting hedgerows will contribute towards reaching net-zero targets, but the degree of this contribution will depend on how many hedges will be planted. Today, ~1780 km of hedges are planted in England every year. To reach the Climate Change Committee goal of +40% hedgerow length, the rate of planting needs to increase fourfold.



■ Planting ■ Gapping up  
**Planting in Countryside and Environmental Stewardships**  
 Data from Natural England Open Data.

## CO<sub>2</sub> sequestration potential by planting scenario

We calculated how much CO<sub>2</sub> will be stored in aboveground biomass (AGB) by 2050, and how much CO<sub>2</sub> will be stored in total biomass and in the soil by 2063 (40 years on) under three different planting scenarios.



Scenario	Hedges planted by 2050	Component	Sequestration by 2050		Sequestration by 2063		Annual offset %
			Tg C	Tg CO <sub>2</sub>	Tg C	Tg CO <sub>2</sub>	
A: Current planting rate	46,250 km	AGB	0.16	0.60	0.28	1.03	0.5
		<b>Total</b>			<b>0.78</b>	<b>2.87</b>	<b>1.3</b>
B: Climate Change Committee goal	193,000 km	AGB	0.67	2.47	0.93	3.41	1.5
		<b>Total</b>			<b>2.76</b>	<b>10.13</b>	<b>4.5</b>
C: DEFRA goal	72,500 km	AGB	0.29	1.06	0.36	1.32	0.6
		<b>Total</b>			<b>1.15</b>	<b>4.22</b>	<b>1.9</b>

### Do you want to know more about these estimates?

- Soil carbon: Biffi, S., et al. (2022). *Journal of Environmental Management*, 114484.
- Biomass: Biffi, S., et al. (2023). *Science of The Total Environment*, 164482.

