TALKING TIMBER

TREE BARK HELPS TO MITIGATE GLOBAL WARMING

***Martin Ansell** considers the role of tree bark in neutralising methane emissions*

In the September/October *Talking Timber* I discussed the ability of tree leaves to reduce the level of particulate pollutants in urban environments. The woody surfaces of trees can also have a beneficial influence on the environment.

In September 2024, two articles in The Times newspaper caught my eye. The first concerned the ability of tree bark to absorb methane to combat global warming *(Paul Simons, Weather Eye, September 7)* and the second reported on record levels of atmospheric methane *(Adam Vaughan, September 11)*.

Prompted by these articles, I will describe sources of methane, stress the impact of methane on global warming and explore the ability of tree bark to absorb methane gas.

Major sources of methane (CH_4) include agricultural emissions, oil and gas wells, combustion of fossil fuels and decomposition of landfill waste. Cattle, sheep, goats and deer, together with other ruminants, contribute to rising levels of methane emissions worldwide. In the first 20 years after entering the atmosphere, the global warming potential of methane is 84 to 87 times greater than carbon dioxide. Hence significant reductions in atmospheric methane have a much greater impact on slowing the rate of global warming than reductions in carbon dioxide.

In a paper published in September 2024, Rob Jackson (Stanford University) and colleagues from 11 research institutions worldwide (https://hal.science/hal-04705417/document) reported in *Environmental Research Letters* that methane concentrations have risen faster over the last period of five years than at any time in history. Anthropogenic emissions (caused or influenced by people) contribute to about 65% of global emissions and rising methane emissions are not sustainable for the future of the planet.

So how can tree bark contribute to the absorption of methane?

The surfaces of woody material in trees, including bark, branches and twigs, contain openings known as lenticels, which allow the passage of gases between the atmosphere and internal tissues. It is the presence of methane consuming (methanotropic) microbes including bacteria within these pores which are thought to react with methane in the presence of oxygen to form carbon dioxide, with a lower global warming potential than methane, and biomass.

In July 2024, Vincent Gauci (University of Birmingham, UK) and 14 colleagues published a paper in Nature entitled *"Global atmospheric methane uptake by upland tree woody surfaces"* (https://www.nature.com/articles/s41586-024-07592-w). Wood cores were removed from trees located in tropical forests in Amazonia and Panama, a temperate broadleaf forest in the UK and a hemiboreal (at the interface between temperate and subarctic) coniferous forest in Sweden.

Using carbon isotopes, they measured uptake of methane by these cores in closed chambers. They observed that core samples taken at approximately waist height and above from upland trees in well drained soils removed methane. Methane uptake was highest in tropical forests but was also significant in temperate and hemiboreal forests. However, broadly speaking, trees in saturated or flooded soils were nett producers of methane.

A laser scanning-derived technique was used to estimate the global woody surface area of trees from which it was calculated that annually 24.6–49.9 Tg (1 Teragram (Tg) = 1,000,000,000 kg) of methane is taken up worldwide by woody surfaces in well drained soils. Hence, forests play an even greater part in reducing greenhouse gases than previously thought.

The rate of global warming can also be lowered by reducing the combustion of fossil fuels, biomass and wood (to reduce the release of CO_2), growing more trees (absorbing CO_2 through photosynthesis) and carbon sequestration (capture and storage of CO_2). However, methane emissions have a much greater impact on global warming than CO_2 emissions, so the uptake of methane by tree bark is very significant. ■

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Below: One source of methane gas