

# Modifying the structure of wood alters plant microbiome

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Modifying the structure of poplar wood can also alter the endosphere microbiome, the bacteria that reside inside tree tissue. This has emerged from research by UHasselt, UGent and VIB. "This is one of the first in-depth studies on the effects of targeted modifications to the wood structure of plants on the microbiome", explain Dr. Bram Beckers and Prof. Jaco Vangronsveld from the Centre for Environmental Sciences (CMK/UHasselt). The results were recently published in the prestigious scientific journal *Proceedings of the National Academy of Sciences* of the United States of America.

The poplars used for this study formed part of field tests set up by VIB under the leadership of Prof. Wout Boerjan (VIB/UGent). In this study, the [researchers](#) looked into how trees with modified wood [structure](#) could be used as a basis for the production of, inter alia, bioethanol. "In this project we were able to reduce the levels of lignin, a component of wood, in the poplars through genetic modification", comments Professor Boerjan. "As a result, two other important components of wood—cellulose and hemicellulose—could be converted more efficiently into sugars, and then, by way of fermentation, into bioethanol."

## Function and structure

UHasselt researchers Bram Beckers and Jaco Vangronsveld wanted to investigate the effects of changes in the structure of wood on [bacteria](#)

found in and around poplars. "Microorganisms play an important role in the growth, development and health of plants, as they do with humans. For example, they help with the absorption of nutrients and offer protection against [harmful bacteria](#) and mould. However, whether or not there is a link between genes and the composition of their microbiome (the community of bacteria, moulds, viruses and other microorganisms) is as yet virtually unknown", states Dr Beckers.

The researchers have now discovered that modifying the composition of poplar wood also alters the function and structure of the microbiome. Prof. Wout Boerjan: "The wood in trees is formed by the cell walls, important components that come into close contact with microorganisms. When you make a relevant alteration to the structure of the wood, even if it is the result of silencing just one gene, this leads to an alteration in the composition of bacteria, moulds, viruses and other microorganisms. This is comparable to a change in the composition of our gut flora as a consequence of continued exposure to another type of food."

The researchers also discovered that these changes only occur within the plant tissue, called the endosphere. They saw no changes to the [soil bacteria](#) that live outside the plant close to the roots of the tree.

## Effects

According to the researchers, unravelling the complex interactions between plants and their microbiome is crucial in order to study the potential effects of modifications to crops. "The results are especially important in allowing the interaction between trees and bacteria to be utilised to obtain higher and more sustainable production of, in this case, poplar wood for bioenergy."

**More information:** Bram Beckers et al. Lignin engineering in field-

grown poplar trees affects the endosphere bacterial microbiome,  
*Proceedings of the National Academy of Sciences* (2016). [DOI:  
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