

Field trial with lignin modified poplars shows potential for bio-based economy

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The results of a field trial with genetically modified poplar trees in Zwijnaarde, Belgium, shows that the wood of lignin modified poplar trees can be converted into sugars in a more efficient way. These sugars can serve as the starting material for producing bio-based products like bio-plastics and bio-ethanol.

The results of the [field trial](#) have been published in a scientific article in which the results of a field trial of French colleagues of the INRA institute in Orleans have also been incorporated. The article has been published in the online edition of *PNAS* of 30 December 2013.

The field trial however also showed that the suppression of the lignin biosynthesis in the trees is variable. In some trees the suppression is stronger than in other trees which is visible through a more pronounced red coloration of the wood beneath the bark. Some branches show almost no red coloration, others a spotty pattern and again other a full red coloration. The branches with the highest red coloration produce 160% more ethanol. On the whole the ethanol yield per gram of wood is 20% higher. This in itself is positive, except for the fact that the modified trees appear to grow somewhat less rapid than non-modified poplar trees.

Prof. Wout Boerjan: "The branches with the highest red coloration give us hope that we will be able to achieve our goal in the future. The biosynthesis of lignin is very complex. We will now search for modifications that provide a strong and uniform suppression of the

lignin biosynthesis. Because in the meantime we are also getting a pretty good idea of what causes the growth retardation, we immediately will start to work on poplars that grow normal, but still have a stable suppression of the lignin production. It must be possible to improve the ethanol yield per tree with 50 to 100%."

In the [poplar trees](#) in the field trial in Zwijnaarde in Belgium the so-called 'CCR-enzyme' is suppressed. This enzyme plays a key role in the biosynthesis of lignin, but its suppression apparently does not lead to a uniform lowering of the amount of lignin. In a new field trial that VIB will start in Wetteren, Belgium, in 2014, trees will be tested in which another enzyme has been suppressed: the 'CAD-enzyme'. In these trees also a more modern way of suppression of the enzyme has been used. This new trial therefore fits into the search for modifications that provide a more uniform suppression of the lignin biosynthesis.

More information: Van Acker et al., Improved saccharification and ethanol yield from field-grown transgenic poplar deficient in cinnamoyl-CoA reductase", *PNAS Early Edition*, December 30, 2013.

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Provided by VIB (the Flanders Institute for Biotechnology)

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