

Analysis of Lignin Carbohydrate Bonds in Plant's Lignin Carbohydrate Complexes

Background

- The lignin-carbohydrate complexes (LCC) in plants have long been regarded to play a crucial role in restricting the fractionation of the biopolymers as well as being the potentially most “recalcitrant” portion of biomass.
- However, the analysis of lignin and carbohydrates bonds remains one of the most challenging in lignocellulose chemistry due to their low abundance, the lack of reliable isolation of LCCs without the creation of possible artifact bonds and the limited analytical techniques.

Approach

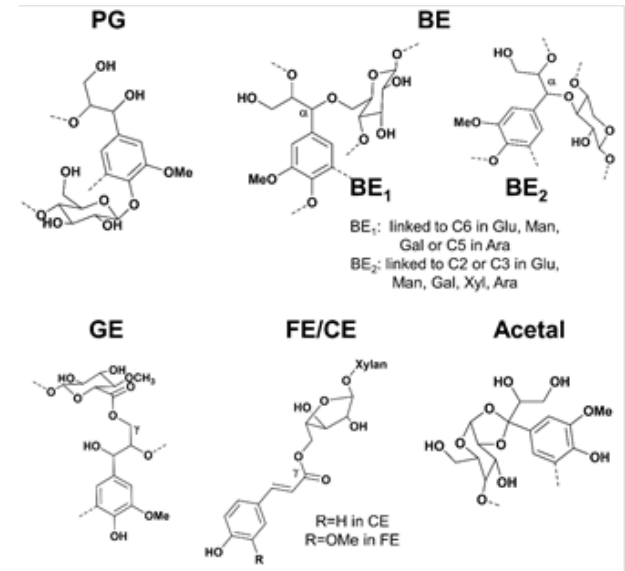
- This review critically discusses the analysis of the lignin carbohydrates complexes with special focus on sample preparation, characterization and analytical techniques. It includes a future outlook on LCC studies.

Outcome

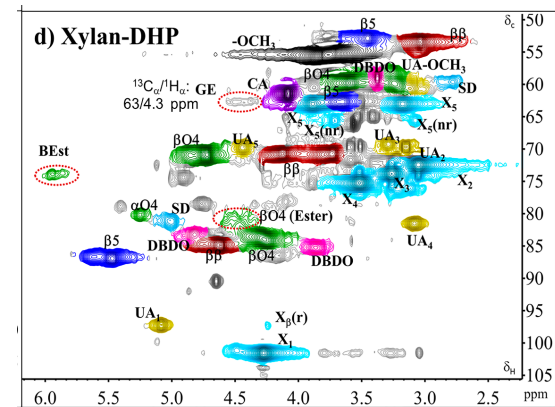
- The LCC preparation leading to high purity and minimal structural changes samples benefit the analysis of lignin-carbohydrates linkages.
- NMR spectroscopic techniques, coupled with novel sample preparation that enriches the lignin-carbohydrates bonds, provide a potential route to overcome signal overlap issues and observe the connectivity between lignin and carbohydrates.

Significance

- This review provides a comprehensive overview as well as the most recent advancement on the analysis of lignin carbohydrates bonds in plants, facilitating understand the LCC structures, a crucial issue surrounding the realization of biorefineries.



Suggested lignin-carbohydrate bonds (LC) in plants. PG=phenyl glycosides, BE=benzyl ethers; GE=ferulate esters; FE=ferulate esters; CE=coumarate esters.



HSQC spectrum of synthetic lignin produced in the presence of beech glucuronoxylan (Xylan-DHP). Presence and absence of characteristic LCCs are marked by red dotted circles