Algemene gegevens	
TKI-Nummer	AF-EU-15025
Titel	Adaptation and Mitigation through Bio-Succinate Innovation (ADMIT Bio-SuccInnovate)
Topsector (A&F of T&U)	A&F
Projectleider (onderzoek)	Dr. Lolke Sijtsma
Werkelijke startdatum	6th January 2014
Werkelijke einddatum	31 March 2017 (For climate KIC, annual reporting before 31.12.2017)
Korte omschrijving inhoud	WFBR is involved in (i) scale-up of enzymatic depolymerisation of CIMV hemicellulose stream and (ii) purification of lignin-rich streams in order to produce lignin fractions which are more suitable as polymer building blocks and have increased value.

Uitvoerende partijen	
Betrokken kennisinstellingen	Wageningen Food & Biobased Research (Reporting, WP2 and 5), Wageningen Environmental Research (not in this report)
Overige partijen	IBERS, Aberystwyth University, Wales, UK, Imperial College, London, UK, Rothamsted, UK, Utrecht University, NL, INRA, Toulouse, France, CIMV, France; Knight-Frank, UK; LCA Works, UK; Ecometrica, UK; Reverdia/DSM, NL; Biocomposites Centre, Bangor, UK;

Highlights
Driven by consumer concerns over the impact of climate change and rising oil prices, there is a growing commercial desire within the chemical industry to move away from commodities traditionally manufactured from petrochemicals and toward the production of bio-based platform chemicals Lignin is a major biomass constituent (15-30% DW) that provides firmness and rigidity to plants. The amount of lignin produced each year in the pulp and paper industry is approximately 50 million tons, of which only 2% is being used for the production of chemicals, while 98% is used as fuel for electricity and heat production. For value added applications of lignin (binders, fibres, polymers, green chemicals such as aromatics, polymer building blocks), the current level of lignin purity is insufficient. In many biomass pre-treatment processes, the lignin fraction still contains impurities such as residual carbohydrates, ash, proteins, extractives, microbial residues. Most applications tolerate these impurities only at low concentration levels. Furthermore, lignin applicability may be increased by enzymatic modification of the lignin (fractions) 1. Solvent fractionation of CIMV lignin. Solvent fractionation of CIMV lignin at kg scale leading to lignin fractions (50-120g) of increasing molar mass and varying in purity and functionality was performed.

2. Acidic purification of lignin.
Supplied lignin contained some carbohydrates, proteins, ash and residual organic acids (acetic and formic acid). Optimal purification conditions were acid hydrolysis with HCl. Yields of recovered lignin are in the range of 65-70%. The overall structure of lignin was not changed remarkably as evidenced by FT-IR. However, using TGA (thermogravimetric analysis) the disintegration temperature of lignin was higher after acidic hydrolysis.

3. Enzymatic conversion / modification of lignin
Laccase catalysed coupling of low molecular weight lignin with a hydroxyl functionalised monomer to increase the available hydroxyl functionalities was optimized and samples were analysed in detail. Coupling of a hydroxyl functionalised monomer to lignin by laccase activity was tested by SEC (size exclusion chromatography), TGA and NMR (31P, 2D) analyses. NMR data will be further analysed. A larger amount of modified lignin was prepared in a 10-fold up-scaled process for application tests as building blocks for polyurethane synthesis. Rigid PUR foams have been prepared using different lignin fractions as polyol.

In addition, production of new microbial enzymes (as developed by INRA) at 10 L scale was realized

Aantal opgeleverde producten			
Wetenschappelijke artikelen	Rapporten	Artikelen in vakbladen	Inleidingen/ workshops/ invited lectures
2	-	-	1

Bijlage: Titels van de producten of een link naar de producten op een openbare website

A. Suchy, A. Winters, D. Bryant, **L. Sijtsma, H. Mooibroek and R. Gosselink**. (2016) Comparative study of lignins from grass, residual cereal biomass and wood for conversion to biopolymers Presentation, 38th Symposium on Biotechnology for Fuels and Chemicals:, Conference Dates: April 25 - 28, 2016, Location: Baltimore, MD. http://www.simbhq.org/sbfc/

A. Suchy, D. Bryant, A. Winters, **L. Sijtsma, R. Gosselink and H. Mooibroek**. (2016) Bioconversion and modification of lignin for the production of biopolymers. Poster, 38th Symposium on Biotechnology for Fuels and Chemicals, April 25 - 28, 2016, Baltimore, MD, http://www.simbhq.org/sbfc/

A. Suchy, D. Bryant, A. Winters**, R. Gosselink, H. Mooibroek and L. Sijtsma** (2016) Effect of steam explosion on the extraction of lignins from grass, residual cereal biomass and wood for the production of high-value products. Poster, 38th Symposium on Biotechnology for Fuels and Chemicals, April 25 - 28, 2016, Baltimore, MD http://www.simbhq.org/sbfc/

Link naar Kennisonline:

http://www.wur.nl/nl/project/Admit-biosuccinovate-1.htm