



## Towards a novel and sustainable biorefinery concept based on green technologies for main commercial grain crop residues (BIOCODE)

The BIOCODE project aims to develop high-value extraction compounds (e.g. protein, oil, waxes, and carotenoids), cellulose and hemicellulose products (nanocelluloses, soluble cellulosic macromolecules, sugars and lactic acid) and lignin based materials (biochar, soil additives, chemicals) from main commercial grain crop residues (corn, rapeseed and wheat co-streams). A sequential fractionation concept based on extraction pre-treatment (fractionation of minor components) followed by hydrothermal destructureation (fractionation of major components) will be developed and integrated with conversion techniques based on lactic acid production (hemicellulose valorisation), deep eutectic solvents (cellulose valorisation) and hydrothermal carbonisation (lignin valorisation). The concept is envisioned to enable flexible and multi-feedstock processing in small-scale units which can be integrated e.g. with bioethanol or pulp mills.

The project will result in a proof-of-concept for the developed holistic fractionation and valorisation technique in lab-scale. During the project, technical feasibility of different process steps, i.e. supercritical CO<sub>2</sub> extraction of intermediates, fractionation of cellulose, hemicellulose and lignin using hydrothermal destructureation, conversion of cellulose using deep eutectic solvents, conversion of hemicellulose to lactic acid and hydrothermal carbonisation of lignin are addressed. Moreover, the suitability of corn, rapeseed and wheat co-stream as feed-stocks for the developed concept will be evaluated. Holistic sustainability and cost evaluation of developed concept is also provided. Project will plan next steps to develop and demonstrate the concept in larger -scale. Overall, these activities will target to provide new scientific information of agro residue fractionation and valorisation, and generate new business opportunities for both SMEs and large enterprises especially for farmers and crop producers, biomaterial refiners, machinery producers, and manufacturers of new bioproducts within EU and Latin America.

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