

Feedstock pre-treatment and production of precursor efficiency for production of biobased chemicals from agricultural residues

Agricultural waste and by-products such as brewery spent grains, tomato pomace and potato peels could be a sustainable source of fermentable carbohydrates to produce biobased chemicals such as polyhydroxyalkanoates (PHAs). However, their carbohydrates are mainly complex polymers that currently require treatment with high temperatures and strong acids to be released. AgriLoop is developing more efficient and cost-effective pretreatment and extraction technologies for these residues, namely thermophilic enzymatic hydrolysis, subcritical water treatment coupled with mild acid hydrolysis, and supercritical CO₂ extraction.

Three thermophilic fungi were grown on brewery spent grains and their enzymes recovered and used for hydrolysing and solubilising this residue. After three days, up to 0.34 gCOD/gCOD of brewery spent grains was solubilized, probably as complex carbohydrates, polymers and/or proteins. Best results for subcritical water pre-treatment were found at 190 °C with brewery spent grains and potato peel residues. Supercritical CO₂ extraction was evaluated for recovering high-value components (i.e., carotenoids, polyphenols, and flavonoids) from all three residues at different temperatures (between 40 and 80°C), pressures and contact times. The characterisation and quantification of all extracted components is in progress. Overall, these technologies have shown promising results enabling a more efficient and cost-effective pretreatment of agricultural residues for the subsequent production of biobased chemicals.

