Master Thesis

Topic: Optimization of the production of hydrolysate from agricultural residues

Hydrolysis can make renewable raw materials such as agricultural residues accessible to microorganisms. However, in addition to the sugars released during hydrolysis, other substances are also formed that can significantly influence microbial growth. Moreover, hydrolysates differ from batch to batch, as the composition of the underlying raw material is subject to natural variations. Modern process control strategies must be able to react to such batch dependencies, so that the development of tolerant fermentation processes for the production of platform chemicals from renewable raw materials can be further advanced.

Aim of the thesis

The aim of the thesis is the optimization of an established process for hydrolysate production from agricultural residues in lab scale. First, a literature research will be conducted to refine the experimental setup and to compare it with the state of the art. After evaluating the found methods, the most promising ones will be experimentally assessed and eventually incorporated into the existing process. To further compare the performance of the generated hydrolysates, they will be applied as cultivation medium in *C. glutamicum* and *S. cerevisiae* fermentations (microtiter plate, Erlenmeyer flask, and 2 L bioreactor scale). A chemically defined artificial hydrolysate will be available as an additional benchmark. Finally, incorporating the optimized process steps into the existing SOP will secure the future generation of high-quality hydrolysates from different agricultural residue batches.

Requirements
- Independent planning of experiments
- Proactive way of working
- Advanced laboratory skills
- Basic fermentation skills
- Basic analytic skills (e.g., HPLC)
- Team player

First steps
- Literature research
- Introduction to lab work
- Order of necessary chemicals and devices (if not available yet)
- Preparation of a detailed timetable (e.g., as a Gantt chart) for the progress of the master thesis (what?, when?, how long?)

Application

Please send your application documents (including CV) to the supervisor of this project: M. Sc. Nico Geisler (nico.geisler@tum.de). He will be happy to answer any further questions you may have.

Start of the project: April 2024