

# Master Thesis

## Topic: Enzyme production by fermentation of *Trichoderma reesei*

Hydrolysis can make renewable raw materials such as agricultural residues accessible to microorganisms. However, using hazardous chemicals like concentrated acids for hydrolysis is environmentally harmful and uneconomical, as special and expensive equipment is required. Therefore, enzymatic hydrolysis with enzyme cocktails directly produced by microorganisms like *Trichoderma reesei* is favorable. The biotechnological production process is realized at mild reaction conditions, has low energy demands, and does not generate harmful waste. By establishing the sustainable production of such enzyme cocktails, the development of tolerant fermentation processes to produce platform chemicals from renewable raw materials can be further advanced.

### Aim of the thesis

The aim of the thesis is the establishment of a fermentation process to produce enzyme cocktails with *Trichoderma reesei* in order to hydrolyze agricultural residues. First, an extensive literature research will be conducted to build the foundation for the experimental design and to incorporate the state of the art. After evaluating various fermentation conditions, the most promising ones will be experimentally assessed. For better classification of the fermentation processes, literature results will serve as benchmarks. To compare the performance of the produced enzyme cocktails with commercially available solutions, they will be used to hydrolyze differently pretreated agricultural residues. The subsequent assessment of the analysis results will provide deep insights into the tested process control strategy and build the basis for appropriate adjustments. Finally, the preparation of an SOP will secure the future generation of high-quality enzyme cocktails for hydrolysis of different agricultural residue batches.

### Requirements

- Independent planning of experiments
- Proactive way of working
- Advanced fermentation skills
- Advanced laboratory 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 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](mailto:nico.geisler@tum.de)). He will be happy to answer any further questions you may have.

Start of the project: March 2024