

15th International

PHARMACEUTICAL MICROBIOLOGY AND BIOTECHNOLOGY CONFERENCE

10th Annual

&

MEDICAL MICROBIOLOGY SUMMIT & EXPO

June 21-23, 2017 London, UK

In depth characterization of the metabolic adaption of *Penicillium chrysogenum* to complex raw material nutrients and specific sugars

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Statement of the Problem: Processes using *Penicillium chrysogenum* for the production of antibiotics are established since the 1940's and are already well described in literature. Generally, these processes are performed in two phases, a batch phase where complex nutrients – mainly corn steep liquor (CSL) are used to enhance spore germination and a fed-batch phase using defined media for product formation. Especially in the batch phase, the mechanism of the positive impact of CSL on growth is still poorly understood and accordingly also the effect of complex media supplements that are transferred in the fed-batch phase. This study focuses on the investigation of CSL and its impact on growth and process performance in both process phases.

Methodology & Theoretical Orientation: Varied methods were developed in order to quantify specific nutrients in CSL with the special focus on amino acids. Batch and Fed-batch cultivations with *P. chrysogenum*, producing Penicillin V, were performed and analyzed concerning variations in its metabolite pattern. Three main topics were investigated in detail: (1) utilization of complex nutrients by the mold, (2) influence of CSL on physiology and (3) morphology of the fungus.

Findings: Correlations in the beforehand mentioned topics of nutrient utilization; physiology and morphology could be found and lead to higher process robustness. Especially information about limiting amino acids enabled an enhanced process control and led to an improved productivity in the main culture.

Conclusion & Significance: Robustness of fungi fermentations is still a challenge in bioprocess development. Therefore, this contribution focuses on a better process understanding in respect to the influence of complex media ingredients on process performance. Especially the results concerning bioavailability of the CSL and its influence on physiology and morphology of the fungus enable an overall deeper understanding of the fermentation.

Biography

Alexandra Hofer is recently doing her PhD thesis at the Technical University of Vienna, Institute of Chemical Engineering. She has done her Diploma thesis in Pharmacy, focusing on the development of novel methods in order to describe the glycol-recognitive drug delivery systems of targeted therapy of urothelial diseases. Thus, she has a strong background in biochemical analytics. At TU Vienna she is mainly focusing on the characterization of different raw material and their impact on process performance, concentrating on filamentous processes.

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