BIOTRANS
LA ROCHELLE 2023

N°1386 / PC
TOPIC(s) : Enzyme production, immobilization / Industrial biocatalysis

Comparison of recombinant protein production in Escherichia coli and Pichia pastoris

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PURPOSE OF THE ABSTRACT

Since the 1980s, E. coli has been preferred as a microbial expression host due to its ability to fast-growing in inexpensive complex media, well-characterized genetics, physiology, and metabolism, quick and straightforward transformation with foreign DNA, and easy-to-scale fermentation process. However, despite this acquired knowledge, difficulties (i.e., the formation of inclusion bodies due to poor solubility) have been faced by many researchers in expressing a biocatalyst from a eukaryotic origin. On the other hand, the efficiency of yeast as a host for recombinant protein expression has proven and has become one of the most abundant alternatives for large-scale protein production [1]. One of them is Pichia pastoris which expresses recombinant proteins both intracellularly and extracellularly, which simplifies protein isolation from the production media. In addition, the concentration of produced proteins is quite high, and the posttranslational modifications are superior to those in prokaryotic expression systems. The gene encoding the protein is mostly located under the control of the alcohol oxidase (AOX) promoter, which is induced by methanol and repressed by glycerol [2]. Engineered monoamine oxidase gene originated from Aspergillus niger was successfully expressed intracellularly in both E. coli BL21(DE3) and P. pastoris CBS7435 MutS, while the productivity of cell extract from P. pastoris was 83 times higher than E. coli extract [3]. Optimised extracellular upscale recombinant protein production protocol for P. pastoris KM71H MutS strain [2] was used for expression of the polymerase enzyme, which is used in RT-qPCR detection of virus RNA molecules, such as SARS-CoV-2 virus. The aim of this work was the comparison of the yield and activity of enzymes produced in E. coli as well as in P. pastoris.

Acknowledgments:
This work was funded by the Slovak Research and Development Agency under contract No. PP-COVID-20-0056 and by the OP Integrated Infrastructure, the project: Research on COVID-19 progressive diagnostic methods and biomarkers useful in early detection of individuals at increased risk of severe disease, ITMS: 313011ATA2, co-financed by the European Regional Development Fund. This work was also supported by COST Action “Non-Conventional Yeasts for the Production of Bioproducts”- YEAST4BIO (CA18229).

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

recombinant protein | P. pastoris | non-conventional yeasts | fermentation

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